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Report No. FHWA-RD-76-30

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T-AND-COVER TUNNELING

Vol. 3. Summary Cost Analyses



December 1979
Final Report


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Prepared for
FEDERAL HIGHWAY ADMINISTRATION
Offices of Research & Development
Washington, D. C. 20590

FOREWORD

This report, Volume 3, Summary Cost Analyses, provides backup cost data for evaluating alternate cut-and-cover tunnel construction systems. The details of the evaluation method are given in Volume 2, which is being distributed concurrently.

Volume 1 of the report was completed in 1976 and single copies were distributed to headquarters and field offices of the Federal Highway Administration and to State highway agencies. Volumes 2 and 3 and the Executive Summary are being given the same distribution. The Supplemental Volume, which contains the extensive cost data used in this study, is not being distributed. All volumes are available to the public through the National Technical Information Service.


Charles F. Scheffey
Director, Office of Research
Federal Highway Administration

NOTICE

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16. Abstract This volume contains summary cost analyses for 15 of the 176 study situations. The analyses give the unit costs of all labor, equipment, and material resources required to complete each project and are typical of the 176 cost estimates prepared for this study. The overall report "Cut-and-Cover Tunneling" includes additional volumes as follows: Volume 1, Construction Methods, Design, and Activity Variations (FHWA-RD-76-28) Volume 2, Cost Analysis and Systems Evaluation (FHWA-RD-76-29) Supplemental Volume, Construction Cost Data, Four Basic Estimates (FHWA-RD-76-139) Executive Summary (FHWA-RD-79-61)					
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PREFACE

In June 1974, the U.S. Department of Transportation, Federal Highway Administration, authorized Jacobs Associates to undertake a study dealing with various aspects of cut-and-cover tunneling operations pertaining to highway and transit structures (Contract No. DOT-FH-11-8513, modified May 30, 1975). A report covering the first phase of the study entitled "Cut-and-Cover Tunneling, Volume 1: Construction Methods, Design and Activity Variations" was submitted in January 1976 and has been published as Report No. FHWA-RD-76-28.

Findings and results of the second and final phase, which dealt primarily with costs of construction and environmental disruptions, are presented in "Cut-and-Cover Tunneling, Volume 2: Cost Analysis and Systems Evaluation," published as Report No. FHWA-RD-76-29.

This volume is not presented as a separate or self-contained report, but rather as an appendix to Volume 2 for those individuals interested in detailed construction costs. It contains the summary cost analyses, in computer printout form, of fifteen construction cost estimates produced for this study.

The Supplemental Volume, Construction Cost Data, Four Basic Estimates, FHWA-RD-76-139, contains complete cost data for four study situations. This 732-page reference volume provides the basic data used for all estimate situations considered in the study.

VOLUME 3

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INTRODUCTION

This volume of a study entitled "Cut-and-Cover Tunneling" prepared for the Federal Highway Administration - U.S. Department of Transportation by Jacobs Associates contains summary analysis of construction costs for fifteen different cut-and-cover tunneling situations. These analyses are part of a series of 176 cost estimates prepared to show comparative evaluation of cost when considering three different transit structures, three methods of ground support, five site conditions, three depths and two methods of bracing. A comparison of cut-and-cover and inverted construction estimates are also included. Various combinations of the above conditions include most possibilities considered for future transit construction.

Volume 1, FHWA-RD-76-28, presents a detailed discussion of various aspects of cut-and-cover tunneling. It defines major construction activities and describes most effective means of accomplishment depending on method of construction. Volume 2, FHWA-RD-76-29, develops basic cost data for cut-and-cover construction and provides a method by which these data can be used to determine the construction cost of future transit structures. It also presents a rationale for making preliminary evaluations of the cost of disruption associated with cut-and-cover tunneling. The detailed cost information presented in this volume was developed during that phase of the study.

The first 12 summaries presented herein relate to cut-and-cover construction of a highway tunnel, a rapid transit station and a rapid transit line section. Three different methods of ground support; soldier piles and lagging, cast-in-place slurry walls (SPTC) and precast concrete diaphragm walls are considered for each structure. Three estimates for each structure are based on use of internal bracing, the fourth on the use of tieback bracing. All structures are built at a 70-foot (21.3m) invert depth. There are three at each of sites 1 and 3 and two at each of sites 2, 4 and 5. The soil and groundwater condition

at these sites is shown in the site cross section preceding each estimate summary. Total project cost is the sum shown for 15 basic activities; 11 being considered as direct cost, the other 4 as indirect and overhead costs. Each activity is broken into various individual work operations required for completion. Quantities of work as well as unit costs of labor, equipment operation, job materials and sub-contract costs are given for each operation which are then summarized to give total cost for the respective activity. Adding a contractors markup to the total project cost gives the anticipated bid price of the work. Markup for this study is assumed as 15%, but is not shown on the printout. Costs of the 15 basic activities and allowance for contractors markup for each of these and the remaining 164 estimates are summarized in Appendix C of Volume 2. All costs are based on mid-1974 prices within the Washington, D.C. area.

Volume 2 describes how the estimates were developed and provides a method by which operation or activity costs can be adjusted to reflect quantities and conditions for new construction situations. It illustrates by example how the planner can use cost detail such as contained in this volume to determine the cost of different alternatives for future work. By adding the cost of disruption, he can then make a decision as to the most effective construction to be used. A procedure for updating the estimate to a new year and location is also given.

The summary analyses are identified by an estimate code which defines the site, type of structure and construction condition. See page ix. The codes which are crosshatched correspond to the estimate summaries given in this volume. The last three summaries designated as 1-1LT, 1-4LT and 1-7LT provide a comparison of costs when using either the cut-and-cover method (1-1LT), inverted or under-the-roof method (1-4LT) or combination method (1-7LT) of constructing a highway tunnel section at a 30-foot (9.1m) depth with site 1 soil conditions. All three methods utilize precast panels and internal bracing. Cost data given for these three estimates can be used the same

as mentioned for other 12, all as described in Volume 2. The estimate designations 1-4LT and 1-7LT were arbitrarily assigned and therefore not shown on the tabulation of page ix. Summaries of activity costs and markup allowances for these three estimates are shown as Table 29, page 180, of Volume 2.

The cross section presented at the beginning of each summary shows the relationship of the underground structure (tunnel or station) to the construction site. The soil and groundwater conditions are also shown. For additional details including ground support and bracing see Section 1 of Volume 2.

The format of the computer printout is the same for all estimates. The construction situation and estimate designation code is shown at the top of each page. The four character code at the left hand side of each page identifies the structure construction and activity requirement as shown on Table 7, page 63, of Volume 2. The next number to the right denotes the various operations required for each activity. This is followed by a description of the operation as well as the quantity of work involved. Total and unit costs for all components (labor, equipment operation, etc.) are given across the page. The percent of total project cost (without contractors markup) - "PCTOT" - represented by each operation and activity is shown after the "Total Column." The activity and operation identification is repeated on the right hand side of the page.

The cost data provided in this volume is given primarily to illustrate the type of detail required to properly evaluate the construction cost of cut-and-cover tunneling. Although summaries included in Volume 2 are adequate to make reasonable cost estimates for many different situations, those requiring a more detailed analysis can do so by using data from this volume and following the procedures discussed in Volume 2.

Table 1. ESTIMATE CODES - 176 STUDY SITUATIONS

DEPTH	30 FEET			50 FEET			70 FEET											
	SOLDIER PILES & LAGGING	CAST-IN SLURRY CONCRETE	PRECAST CONCRETE PANELS	SOLDIER PILES & LAGGING	CAST-IN SLURRY CONCRETE	PRECAST CONCRETE PANELS	SOLDIER PILES & LAGGING	CAST-IN SLURRY CONCRETE	PRECAST CONCRETE PANELS									
GROUND SUPPORT	INT. T. B.			INT. T. B.			INT. T. B.											
BRACING	INT. T. B.			INT. T. B.			INT. T. B.											
FOUR LANE HIGHWAY TUNNEL	SITE 1	1-1CT	1-1HT	1-1JT	1-1KT	1-1LT	1-1GV	1-1HV	1-1JV	1-1KV	1-1LV	1-1MV	1-1CY	1-1HY	1-1JY	1-1KY	1-1LY	1-1MY
	SITE 2	2-1CU	2-1HU	2-1JU	2-1KU	2-1LU	2-1GW	2-1HW	2-1JU	2-1KW	2-1LW	2-1MW	2-1GZ	2-1HZ	2-1JZ	2-1KZ	2-1LZ	2-1MZ
	SITE 3	-	-	3-1JT	3-1KT	3-1LT	-	-	-	3-1JV	3-1LW	3-1MV	-	-	3-1JY	3-1KY	3-1LY	3-1MY
	SITE 4	-	-	4-1JT	4-1KT	4-1LT	-	-	-	4-1JV	4-1LW	4-1MV	-	-	4-1JY	4-1KY	4-1LY	4-1MY
	SITE 5	-	-	5-1JT	-	5-1LT	-	-	-	5-1JV	-	5-1MV	-	-	5-1JY	-	5-1LY	-
RAPID TRANSIT STATION	SITE 1	-	-	-	-	-	1-2GV	1-2HV	1-2JV	1-2KV	1-2LV	1-2MV	1-2CY	1-2HY	1-2JY	1-2KY	1-2LY	1-2MY
	SITE 2	-	-	-	-	-	2-2GW	2-2HW	2-2JV	2-2KW	2-2LW	2-2MW	2-2GZ	2-2HZ	2-2JZ	2-2KZ	2-2LZ	2-2MZ
	SITE 3	-	-	-	-	-	-	-	3-2JV	3-2KV	3-2LV	3-2MV	-	-	3-2JY	3-2KY	3-2LY	3-2MY
	SITE 4	-	-	-	-	-	-	-	4-2JV	4-2KV	4-2LV	4-2MV	-	-	4-2JY	4-2KY	4-2LY	4-2MY
	SITE 5	-	-	-	-	-	-	-	5-2JV	-	5-2LV	-	-	-	5-2JY	-	5-2LY	-
RAPID TRANSIT LINE SECTION	SITE 1	1-3GT	1-3HT	1-3JT	1-3KT	1-3LT	1-3GV	1-3HV	1-3JV	1-3KV	1-3LV	1-3MV	1-3GY	1-3HY	1-3JY	1-3KY	1-3LY	1-3MY
	SITE 2	2-3CU	2-3HU	2-3JU	2-3KU	2-3LU	2-3GW	2-3HW	2-3JV	2-3KW	2-3LW	2-3MW	2-3GZ	2-3HZ	2-3JZ	2-3KZ	2-3LZ	2-3MZ
	SITE 3	-	-	3-3JT	3-3KT	3-3LT	-	-	-	3-3JV	3-3LW	3-3MV	-	-	3-3JY	3-3KY	3-3LY	3-3MY
	SITE 4	-	-	4-3JT	4-3KT	4-3LT	-	-	-	4-3JV	4-3LW	4-3MV	-	-	4-3JY	4-3KY	4-3LY	4-3MY
	SITE 5	-	-	5-3JT	-	5-3LT	-	-	-	5-3JV	-	5-3MV	-	-	5-3JY	-	5-3LY	-

Shaded areas represent estimates summarized in this volume.

Table 2. ESTIMATE CODE DESIGNATIONS

FIRST CHARACTER - Site Condition

- 1 - Site 1
- 2 - Site 2
- 3 - Site 3
- 4 - Site 4
- 5 - Site 5

SECOND CHARACTER - Type of Structure

- 1 - Four Lane Highway
- 2 - Rapid Transit Station
- 3 - Rapid Transit Line Section

THIRD CHARACTER - Ground Support & Bracing Method

- G - Soldier Piles & Lagging - Internal Bracing
- H - Soldier Piles & Lagging - Tieback Bracing
- J - SPTC Wall - Internal Bracing
- K - SPTC Wall - Tieback Bracing
- L - Precast Panel Wall - Internal Bracing
- M - Precast Panel Wall - Tieback Bracing

FOURTH CHARACTER - Depth of Excavation - Soil Condition

- T - 30 ft Depth - High Water Table
- U - 30 ft Depth - Low Water Table
- V - 50 ft Depth - High Water Table
- W - 50 ft Depth - Low Water Table
- Y - 70 ft Depth - High Water Table
- Z - 70 ft Depth - Low Water Table

Table 3. ACTIVITY CODE DESIGNATIONS

FIRST CHARACTER - TYPE OF STRUCTURE

1. FOUR LANE HIGHWAY TUNNEL
2. RAPID TRANSIT STATION
3. TWIN BOX RAPID TRANSIT TUNNEL

SECOND CHARACTER - MAJOR ESTIMATE ACTIVITY

- A. CONTROL TRAFFIC
- B. UTILITY WORK
- C. PROJECT ADJACENT STRUCTURES
- D. CONTROL GROUND WATER
- E. DECKING
- F. GROUND WALL SUPPORT
- G. BRACING
- H. EXCAVATION
- I. CONSTRUCT PERMANENT STRUCTURE
- J. BACKFILL
- K. RESTORATION

- N. OVERHEAD (FIXED COSTS)
- O. OVERHEAD (TIME RELATED COSTS)
- P. PLANT (FIXED COSTS)
- Q. PLANT (TIME RELATED COSTS)

THIRD CHARACTER - TYPE OF WALL AND/OR BRACING

- A. SOLDIER PILE AND LAGGING WALL ONLY
- B. S.P.T.C. WALL ONLY
- C. PRECAST WALL ONLY

- D. DIAPHRAGM WALL - IE, S.P.T.C. OR PRECAST WALL

- E. INTERNAL BRACING ONLY
- F. TIEBACK BRACING ONLY

- G. SOLDIER PILE AND LAGGING WALL WITH INTERNAL BRACING
- H. SOLDIER PILE AND LAGGING WALL WITH TIEBACK BRACING

- J. S.P.T.C. WALL WITH INTERNAL BRACING
- K. S.P.T.C. WALL WITH TIEBACK BRACING

- L. PRECAST WALL WITH INTERNAL BRACING
- M. PRECAST WALL WITH TIEBACK BRACING

FOURTH CHARACTER - DEPTH OF EXCAVATION AND/OR WET OR DRY SOIL CONDITION

- N. 30 FT DEPTH ONLY
- P. 50 FT DEPTH ONLY
- Q. 70 FT DEPTH ONLY

- R. WET CONDITION ONLY
- S. DRY CONDITION ONLY

- T. 30 FT DEPTH WITH HIGH WATER TABLE
- U. 30 FT DEPTH WITH LOW WATER TABLE

- V. 50 FT DEPTH WITH HIGH WATER TABLE
- W. 50 FT DEPTH WITH LOW WATER TABLE

- Y. 70 FT DEPTH WITH HIGH WATER TABLE
- Z. 70 FT DEPTH WITH LOW WATER TABLE

NOTE: IN THE THIRD AND FOURTH CHARACTER WHERE NO VARIABLE CONDITION APPLIES A "0" (ZERO) WILL BE USED.

METRIC CONVERSION FACTORS

For Tables, Figures and Estimate Quantities

1"	=	1 in.	=	25.4 mm
1'	=	1 ft.	=	0.305 m
1 SF	=	1 sq. ft.	=	0.0929 m ²
1 SY	=	1 sq. yd.	=	0.836 m ²
1 MSF	=	1000 sq. ft.	=	92.9 m ²
1 CF	=	1 cu. ft.	=	0.0283 m ³
1 CY	=	1 cu. yd.	=	0.765 m ³
1 MBF	=	1000 bd. ft.	=	2.36 m ³
1 LB	=	1 lb.	=	0.454 kg
1 T	=	1 ton	=	907 kg
1 BAG (94 lb.)			=	42.6 kg
1 BAG (100 lb.)			=	45.4 kg
1 GAL	=	1 gallon	=	3.79 litres
1 CFM	=	1 cu. ft./min.	=	0.000472 m ³ /s
1 HP	=	1 hp	=	746 W

SUMMARY ANALYSIS
OF
ESTIMATE DOT 2-1GZ

FOUR LANE HIGHWAY TUNNEL
SITE 2 - 70' DEPTH
SOLDIER PILE & LAGGING GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

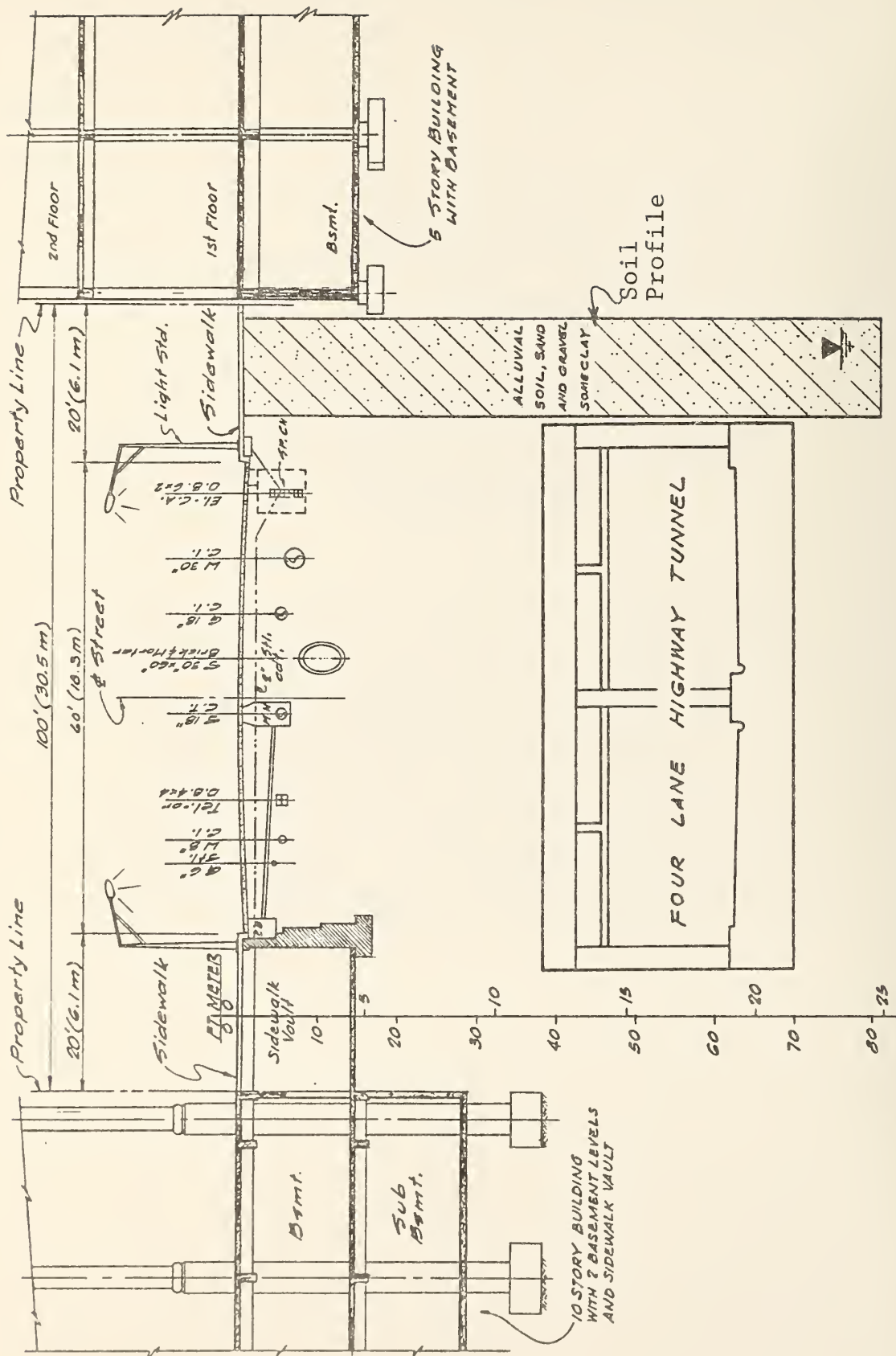


Figure 1. PROJECT 2-1GZ - HIGHWAY TUNNEL
 SITE 2 - 70' DEPTH
 SOLDIER PILES & LAGGING - INTERNAL BRACING

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT
 DOT 2-1GZ

TOTAL COST ANALYSIS		PROJECT SUMMARY					
LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
TOTAL ESTIMATE	10196734	2053493	7102639	5043367	1772012	26168245	100.000
PROJECT					26168245	100.000	

		TOTAL COST ANALYSIS				PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT		
1A00 1	CONST.BARRICADES ETC. 45 DA	42253 938.956	1166 25.911	37713 838.067			81132 1802.933	.310	1A00 1	
1A00 2	SET&MOVE BARRICADES ET 45 DA	28807 640.156	2718 60.400	5271 117.133			36796 817.639	.141	1A00 2	
1A00 3	FLAGMEN-DIRECT TRAFFIC 300 DA	46416 154.720		3249 10.830			49665 165.550	.190	1A00 3	
1A00 ITEM	CONTROL TRAFFIC	117476	3884	46233			167593	.640	1A00 ITEM	
1BA1 1	ALL OPERATIONS	198151	18680	199450	8000	1219044	1643325	6.280	18A1 1	
18A1 ITEM	UTILITY WORK-ALTERNATE	198151	18680	199450	8000	1219044	1643325	6.280	18A1 ITEM	
1CAQ 1	GENL EXTERIOR PROTECT 40 DA	21501 537.525	6955 173.875	7550 188.750			36006 900.150	.138	1CAQ 1	
1CAQ 2	SIDEWALK VAULTS & WALLS 1000 LF	94179 94.179	18024 18.024	21703 21.703	22979 22.979		156885 156.885	.600	1CAQ 2	
1CAQ 3	CONTROL PIERS 50 EA	78945 1578.900	8135 162.700	37725 754.500			124805 2496.100	.477	1CAQ 3	
1CAQ 6	UNDERPIN-PREP FTGS&CON 50 EA	299676 5993.520	32276 645.520	125443 2508.860			457395 9147.900	1.748	1CAQ 6	
1CAQ 7	UNDERPIN-JACK PILES 300 EA	629760 2099.200	2745 9.150	123962 413.207			756467 2521.557	2.891	1CAQ 7	

DOT 2-1GZ

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

PROJECT SUMMARY

TOTAL COST ANALYSIS

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1CAQ 8	UNDERPIN-PREP FTGS&CON 50 EA	299676 5993.520	32276 645.520	125443 2508.860			457395 9147.900	1.748	1CAQ 8
1CAQ 9	UNDERPIN-JACK PILES 300 EA	472320 1574.400	2059 6.863	169204 564.013			643583 2145.277	2.459	1CAQ 9
1CAQ ITEM	PROTECT ADJ STRUCTURES	1896057	102470	611030	22979		2632536	10.060	1CAQ ITEM
1E00 1	CENTER PILE EXPL HOLE 168 EA	14847 88.375	2083 12.399	4339 25.827			21269 126.601	.081	1E00 1
1E00 2	DRILL HOLES-CENTR PILE 168 EA	56098 333.917	66441 395.482	3927 23.375			126466 752.774	.483	1E00 2
1E00 4	SPLICE,PLACE,TRIM,PILE 168 EA	34065 202.768	12555 74.732	135925 809.077			182545 1086.577	.698	1E00 4
1E00 5	BACKFILL PILE HOLES 168 EA	14776 87.952	3706 22.060	16453 97.935			34935 207.946	.134	1E00 5
1E00 6	PILE CAPS,WALES,DECKBM 2000 TON	236392 118.196	51787 25.894	1016547 508.274			1304726 652.363	4.986	1E00 6
1E00 7	LATERAL & SWAY BRACING 150 TON	77158 514.387	13850 92.333	110401 736.007			201409 1342.727	.770	1E00 7
1E00 8	DECK MATS & TIMBERS 16444 SY	75258 4.577	5558 .338	580808 35.320			661624 40.235	2.528	1E00 8
1E00 9	REPOST DECK SUPPORT 168 EA	81144 483.000	25140 149.643	18280 108.810			124564 741.452	.476	1E00 9

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1E00 11 REMOVE TIMBER DECKING 16444 SY	37504 2.281	5794 .352	2625 .160			45923 2.793	.175 1E00 11
1E00 12 RMV.DECK BMS.&INT.PILE 1982 TON	87621 44.208	37445 18.893	6133 3.094			131199 66.195	.501 1E00 12
1E00 13 REMOVE WALES & CAPS 482 TON	34091 70.728	14569 30.226	2386 4.950			51046 105.905	.195 1E00 13
1E00 14 REM.LAG.&PILES TO -6 4000 LF	31831 7.958	8611 2.153	2228 .557			42670 10.668	.163 1E00 14
1E00 ITEM STREET DECKING 16444 SY	780785 47.481	247539 15.053	1900052 115.547			2928376 178.082	11.191 1E00 ITEM
1FAQ 1 TRENCH FOR SOLD PILES 4000 LF	88368 22.092	12400 3.100	10586 2.647			111354 27.839	.426 1FAQ 1
1FAQ 2 DRILL HOLES FOR PILES 41000 LF	85569 2.087	101347 2.472	20340 .496			207256 5.055	.792 1FAQ 2
1FAQ 3 SPLICE,PLACE,TRIM PILE 500 EA	101382 202.764	37365 74.730	746297 1492.594			885044 1770.088	3.382 1FAQ 3
1FAQ 4 BACKFILL PILE HOLES 500 EA	32981 65.962	8273 16.546	48839 97.678			90093 180.186	.344 1FAQ 4
1FAQ 5 PLACE LAGGING 280000 SF	336999 1.204	30913 .110	252390 .901			620302 2.215	2.370 1FAQ 5
1FAQ ITEM GROUND SUPPORT WALL 31111 SY	645299 20.742	190298 6.117	1078452 34.665			1914049 61.523	7.314 1FAQ ITEM

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1GEQ 1	SET BRACING LEVEL NO 2 1051 TON	93290 88.763	27213 25.892	532030 506.213			652533 620.869	2.494
1GEQ 2	PRESTRESS LEVEL NO 2 1051 TON	21489 20.446	501 .477	1504 1.431			23494 22.354	.090
1GEQ 3	SET BRACING LEVEL NO 3 1142 TON	97316 85.215	28387 24.857	577812 505.965			703515 616.038	2.688
1GEQ 4	PRESTRESS LEVEL NO 3 1142 TON	22416 19.629	523 .458	1569 1.374			24508 21.461	.094
1GEQ 5	SET BRACING LEVEL NO 4 764 TON	73989 96.844	21582 28.249	387179 506.779			482750 631.872	1.845
1GEQ 6	PRESTRESS LEVEL NO 4 764 TON	17043 22.308	397 .520	1193 1.562			18633 24.389	.071
1GEQ 7	SET BRACING LEVEL NO 5 632 TON	67320 106.519	19637 31.071	320712 507.456			407669 645.046	1.558
1GEQ 8	PRESTRESS LEVEL NO 5 632 TON	15506 24.535	362 .573	1085 1.717			16953 26.824	.065
1GEQ 11	REMOVE BRACING LEVEL 5 632 TON	21920 34.684	9207 14.568	1534 2.427			32661 51.679	.125
1GEQ 12	REMOVE BRACING LEVEL 4 764 TON	26499 34.685	11129 14.567	1855 2.428			39483 51.679	.151
1GEQ 13	REMOVE BRACING LEVEL 3 1142 TON	39608 34.683	16635 14.567	2773 2.428			59016 51.678	.226

HIGHWAY TUNNEL-SITE-2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

DOT 2-1GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

		LA8OR	EQPT	JOB MATL	PERM MATL	SUB-CGNT	TOTAL	PCTOT	
1GEQ 14	REMOVE BRACING LEVEL 2 1051 TON	36446 34.677	15307 14.564	2551 2.427			54304 51.669	.208	1GEQ 14
1GEQ ITEM	INTERNAL BRACING 3589 TON	532842 148.465	150880 42.040	1831797 510.392			2515519 700.897	9.613	1GEQ ITEM
1HEQ 1	BREAK PAVEMENT & HAUL 15300 SY	35921 2.348	14949 .977	2514 .164			53384 3.489	.204	1HEQ 1
1HEQ 2	EXCAVATE FIRST 5 FT 25600 CY	138150 5.396	66739 2.607	9671 .378			214560 8.381	.820	1HEQ 2
1HEQ 3	EXCAVATE 5 TO 22 FT 86900 CY	221074 2.544	166139 1.912	15475 .178			402688 4.634	1.539	1HEQ 3
1HEQ 4	EXCAVATE 22 TO 30 FT 40900 CY	100627 2.460	108500 2.653	7044 .172			216171 5.285	.826	1HEQ 4
1HEQ 5	EXCAVATE 30 TO 50 FT 102200 CY	217506 2.128	276340 2.704	15225 .149			509071 4.981	1.945	1HEQ 5
1HEQ 6	EXCAVATE 50 TO 70 FT 102200 CY	241682 2.365	307057 3.004	16918 .166			565657 5.535	2.162	1HEQ 6
1HEQ 7	FINE GRADE INVERT 15300 SY	65771 4.299	30166 1.972	4504 .301			100541 6.571	.384	1HEQ 7
1HEQ ITEM	EXCAVATION 357800 CY	1020731 2.853	969890 2.711	71451 .200			2062072 5.763	7.880	1HEQ ITEM

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

11AR	1	LEVELING SLAB FORMS 20 EA	TOTAL COST ANALYSIS				PROJECT SUMMARY			PCTOT	
			LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL			
			11966		3988				15954	.061	11AR 1
			598.300		199.400				797.700		
11AR	2	POUR LEVELING SLAB 1640 CY	27040	2762	1893	49029			80724	.308	11AR 2
			16.488	1.684	1.154	29.896			49.222		
11AR	3	BASE SLAB REBAR, 2406 TON	371374	26562	25996	1010520			1434452	5.482	11AR 3
			154.353	11.040	10.805	420.000			596.198		
11AR	4	BASE SLAB BLK HDS&WK. FM 19340 SF	119664		13127				132791	.507	11AR 4
			6.187		.679				6.866		
11AR	5	BASE SLAB-POUR, CLEANUP 32080 CY	135204	13808	9464	968072			1126548	4.305	11AR 5
			4.215	.430	.295	30.177			35.117		
11AR	9	ASSEM. STL. WL&RF&PL FRM 20 DA	21406	1947	164618				187971	.718	11AR 9
			1070.300	97.350	8230.900				9398.550		
11AR	11	WALL REBAR 739 TON	161232	9990	11286	310380			492888	1.884	11AR 11
			218.176	13.518	15.272	420.000			666.966		
11AR	12	MOVE & SET STEEL FORMS 2000 LF	423539		42198				465737	1.780	11AR 12
			211.770		21.099				232.869		
11AR	13	ROOF SLAB REBAR 1510 TON	358727	22227	25111	634200			1040265	3.975	11AR 13
			237.568	14.720	16.630	420.000			688.917		
11AR	14	POUR WALLS & ROOF SLAB 29980 CY	155310	15861	10872	904784			1086827	4.153	11AR 14
			5.180	.529	.363	30.180			36.252		
11AR	15	PLACE ROOF WATERPROOF 15300 SY							156825	.599	11AR 15
									10.250		

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

DOT 2-1GZ

	TOTAL COST ANALYSIS				PROJECT SUMMARY			PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL		
1IAR 16	MORTAR PROT. FOR W.P. 1680 CY	3691 2.197	3479 2.071	65092 38.745		97969 58.315	.374	1IAR 16
1IAR 17	FORM PLENUM DECK 2000 LF	81576 40.788	8380 4.190			89956 44.978	.344	1IAR 17
1IAR 18	PLEN.DECK REBAR 240 TON	60160 250.667	2650 11.042	4211 17.546	76800 320.000	143821 599.254	.550	1IAR 18
1IAR 19	POUR PLENUM DECK 3000 CY	55226 18.409	9466 3.155	3866 1.289	99674 33.225	168232 56.077	.643	1IAR 19
1IAR 20	CONST.PLENUM DIV. WALL 200 CY	20218 101.090	1261 6.305	2105 10.525	12250 61.250	35834 179.170	.137	1IAR 20
1IAR 21	ELECTRICAL EMBEDDED					230000	.879	1IAR 21
1IAR 22	MECHANICAL EMBEDDED					105000	.401	1IAR 22
1IAR 23	PATCH&POINT CONC.WORK 416000 SF	84947 .204	5939 .014		4900 .012	95686 .230	.366	1IAR 23
1IAR 24	CLEAN UP STRUCTURE 20 DA	11829 591.450	662 33.100	828 41.400		13319 665.950	.051	1IAR 24
1IAR ITEM	CONSTRUCT PERM.STRUCT. 66900 CY	2125025 31.764	110887 1.658	337361 5.043	4135701 61.819	7200799 107.635	27.517	1IAR ITEM
1JEQ 1	BACKFILL & TAMP 2 FT 10200 CY	59773 5.860	2656 .260	4184 .410	40800 4.000	107413 10.531	.410	1JEQ 1

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

DOT 2-1GZ

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1JEQ 2	230586	28643	16141	408800		684170	2.615
102200 CY	2.256	.280	.158	4.000		6.694	
1JEQ 3	108694	13501	7609	224800		354604	1.355
56200 CY	1.934	.240	.135	4.000		6.310	
1JEQ 4	173282	21524	12130	102400		309336	1.182
25600 CY	6.769	.841	.474	4.000		12.083	
1JEQ ITEM	572335	66324	40064	776800		1455523	5.562
194200 CY	2.947	.342	.206	4.000		7.495	
1K00 1	13803	3800	966	16700		35269	.135
13350 SY	1.034	.285	.072	1.251		2.642	
1K00 2	13803	3800	966	10680		29249	.112
13350 SY	1.034	.285	.072	.800		2.191	
1K00 3					42343	42343	.162
					3.172	3.172	
1K00 5	13763	5736	965			20484	.078
5870 SY	2.348	.977	.164			3.490	
1K00 6	66686	8283	4668	40000		119637	.457
9852 CY	6.769	.841	.474	4.060		12.143	
1K00 7	13416	3693	939	5200		23248	.089
7785 SY	1.723	.474	.121	.668		2.986	

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1K00 8 PLACE 4IN CONC. SIDEWALK 7785 SY	45719 5.873		4340 .557	27307 3.508		77366 9.938	.296 1K00 8
1K00 9 ACCESS WALKWAY 40 DA	18663 466.575	1325 33.125	5554 138.850			25542 638.550	.098 1K00 9
1K00 ITEM STREET RESTORATION 13350 SY	185873 13.923	26637 1.995	18398 1.378	99887 7.482	42343 3.172	373138 27.950	1.426 1K00 ITEM
1N00 1 FIXED EXPENSE	67200	30000	217704			314904	1.203 1N00 1
1N00 ITEM OVERHEAD-FIXED COSTS	67200	30000	217704			314904	1.203 1N00 ITEM
10GQ 1 OVERHEAD LABOR 34 MO	1066200 31358.824		74634 2195.118			1140834 33553.941	4.360 10GQ 1
10GQ 2 OVERHEAD EXPENSES 34 MO			358700 10550.000			358700 10550.000	1.371 10GQ 2
10GQ 3 GENERAL SERVICE CREW 600 DA	906000 1510.000	77004 128.340	63420 105.700			1046424 1744.040	3.999 10GQ 3
10GQ 4 VEHICLE OPERATION 34 MO		34000 1000.000				34000 1000.000	.130 10GQ 4
10GQ ITEM OVERHEAD-TIME RELATED 34 MO	1972200 58005.882	111004 3264.824	496754 14610.412			2579958 75881.118	9.859 10GQ ITEM

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

DOT 2-1GZ

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1P00 1 FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	.789
1P00 ITEM PLANT-FIXED COSTS	82760	25000	79793		18800	206353	.789
1QGG 1 TIME RELATED COSTS			174100			174100	.665
34 MO			5120.588			5120.588	
1QGG ITEM PLANT-TIME RELATED			174100			174100	.665
34 MO			5120.588			5120.588	

HIGHWAY TUNNEL-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-1GZ

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	10196734	2053493	7102639	5043367	1772012	26168245	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 5-1JY

FOUR LANE HIGHWAY TUNNEL
SITE 5 - 70' DEPTH
CAST-IN-SLURRY CONCRETE (SPTC) GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

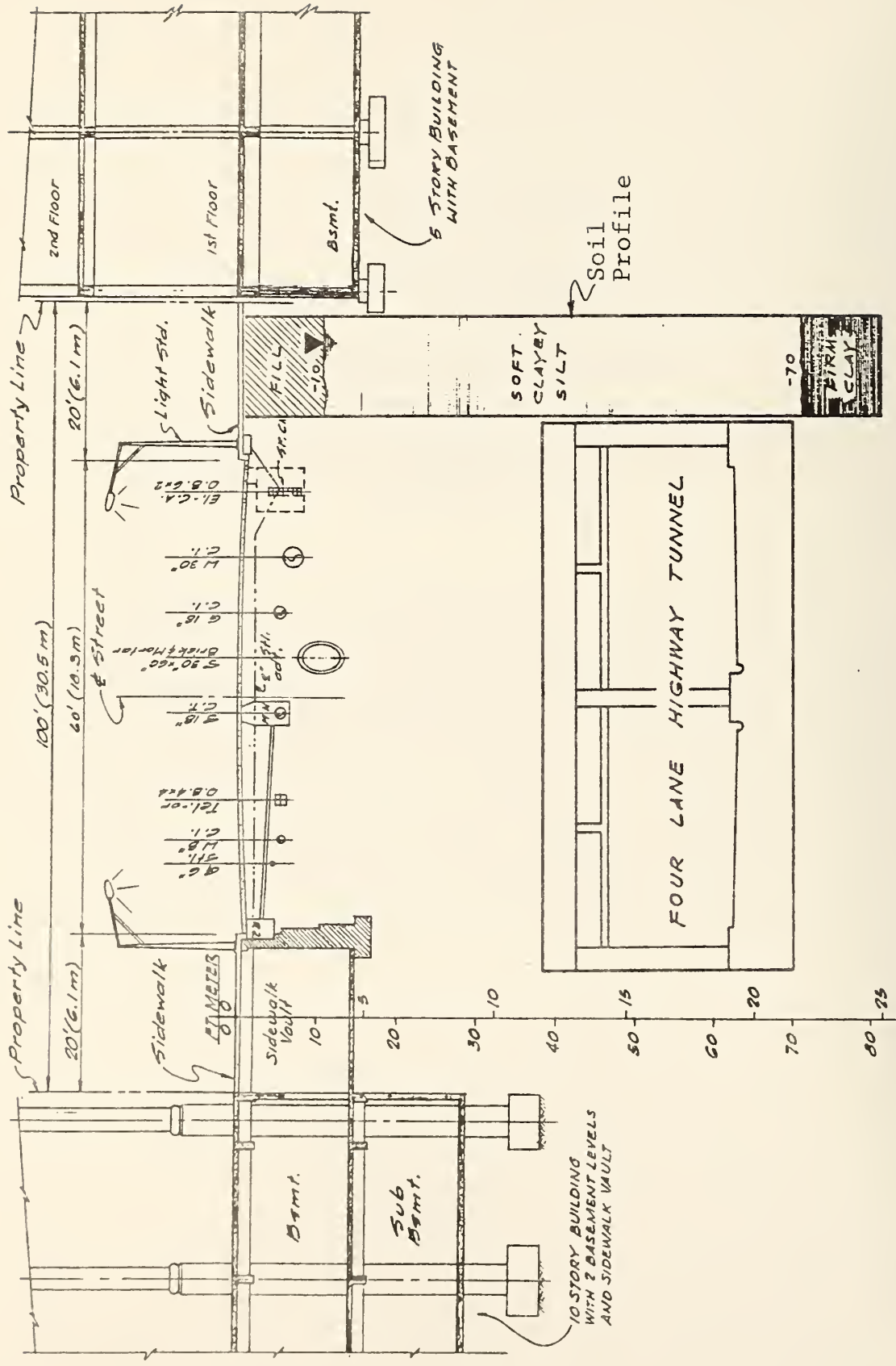


Figure 2. PROJECT 5-1JY - HIGHWAY TUNNEL
 SITE 5 - 70' DEPTH
 CAST-IN-SLURRY (SPTC) - INTERNAL BRACING

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 5-1JY

TOTAL COST ANALYSIS		PROJECT SUMMARY				
LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
9684999	2636244	11112385	4906886	2263455	30603969	100.000
TOTAL ESTIMATE						

PROJECT

30603969 100.000

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1A00 1	CONST.BARRICADES ETC. 45 DA	42253 938.956	1166 25.911	37713 838.067			81132 1802.933	.265	1A00 1
1A00 2	SET&MOVE BARRICADES ET 45 DA	28807 640.156	2718 60.400	5271 117.133			36796 817.689	.120	1A00 2
1A00 3	FLAGMEN-DIRECT TRAFFIC 330 DA	51058 154.721		3574 10.830			54632 165.552	.179	1A00 3
1A00	ITEM CONTROL TRAFFIC	122118	3884	46558			172560	.564	1A00 ITEM
1BD1 1	ALL OPERATIONS	198151	18680	199450	8000	1719712	2143993	7.006	1BD1 1
1BD1	ITEM UTILITY WORK-ALTERNATE	198151	18680	199450	8000	1719712	2143993	7.006	1BD1 ITEM
1CD0 1	GENL EXTERIOR PROTECT 40 DA	21501 537.525	6955 173.875	7550 188.750			36006 900.150	.118	1CD0 1
1CD0 2	SIDEWALK VAULTS & WALLS 1000 LF	94179 94.179	18024 18.024	21703 21.703	22979 22.979		156885 156.885	.513	1CD0 2
1CD0	ITEM PROTECT ADJ STRUCTURES	115680	24979	29253	22979		192891	.630	1CD0 ITEM
1DDY 1	TRENCH & SUMP-EXCAV. 220 DAY	109191 496.323	22352 101.600	45143 205.195			176686 803.118	.577	1DDY 1
1DDY 2	CONSTR INVERT SUMPS 3 EA	8130 2710.000	1259 419.667	982 327.333			10371 3457.000	.034	1DDY 2

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING--70 FOOT

DOT 5-1JY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1DDY 3 PUMPING FROM SUMPS 380 DAY	182875 481.250	41132 108.242	12801 33.687			236808 623.179	.774 1DDY 3
1DDY ITEM CONTROL GROUNDWATER	300196	64743	58926			423865	1.385 1DDY ITEM
1E00 1 CENTER PILE EXPL HOLE 168 EA	14847 88.375	2083 12.399	4339 25.827			21269 126.601	.069 1E00 1
1E00 2 DRILL HOLES-CENTR PILE 168 EA	56098 333.917	66441 395.482	3927 23.375			126466 752.774	.413 1E00 2
1E00 3 OPERATE SLURRY EQUIP 84 SH	36657 436.393	8279 98.560	5629 67.012			50565 601.964	.165 1E00 3
1E00 4 SPLICE, PLACE, TRIM, PILE 168 EA	34065 202.768	12555 74.732	135925 809.077			182545 1086.577	.596 1E00 4
1E00 5 BACKFILL PILE HOLES 168 EA	14776 87.952	3706 22.060	16453 97.935			34935 207.946	.114 1E00 5
1E00 6 PILE CAPS, WALES, DECKBM 1947 TON	230123 118.194	50414 25.893	989609 508.274			1270146 652.361	4.150 1E00 6
1E00 7 LATERAL & SWAY BRACING 150 TON	77158 514.387	13850 92.333	110401 736.007			201409 1342.727	.658 1E00 7
1E00 8 DECK MATS & TIMBERS 16222 SY	64961 4.005	4797 .296	572317 35.280			642075 39.581	2.098 1E00 8
1E00 9 REPOST DECK SUPPORT 168 EA	81144 483.000	25140 149.643	18280 108.810			124564 741.452	.407 1E00 9

DOT 5-1JY

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1E00 11 REMOVE TIMBER DECKING 16222 SY	36228 2.233	5596 .345	2536 .156			44360 2.735	.145
1E00 12 RMV. DECK BMS. & INT. PILE 1900 TON	84002 44.212	35899 18.894	5880 3.095			125781 66.201	.411
1E00 13 REMOVE WALES & CAPS 450 TON	31832 70.738	13603 30.229	2228 4.951			47663 105.918	.156
1E00 14 REM. LAG. & PILES TO -6 4000 LF	31831 7.958	8611 2.153	2228 .557			42670 10.668	.139
1E00 ITEM STREE? DECKING 16222 SY	793722 48.929	250974 15.471	1869752 115.260			2914448 179.650	9.523
1FBY 1 MOB. SLURRY PLT. & EQUIP. 30 DA	17083 569.433	30490 1016.333	1196 39.867			48769 1625.633	.159
1FBY 2 TRENCH @ WALL LOCATION 4000 LF	88368 22.092	12400 3.100	10586 2.647			111354 27.839	.364
1FBY 3 DRILL HOLES FOR PILES 31730 LF	84761 2.671	100388 3.164	5933 .187			191082 6.022	.624
1FBY 4 SPLICE PLACE, TRIM PILE 668 EA	135449 202.768	49921 74.732	2727526 4083.123			2912896 4360.623	9.518
1FBY 5 EXCAV. BETWEEN PILES 33333 CY	192097 5.763	245362 7.361	13447 .403			450906 13.527	1.473

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 5-1JY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1FBY 6 OPERATE SLURRY EQUIP. 360 SH	157104 436.400	35482 98.561	97797 271.658			290383 806.619	.949
1FBY 7 PLACE TREMIE CONC. 28889 CY	150751 5.218	59822 2.071	874103 30.257			1084676 37.546	3.544
1FBY 8 DEMOB. SLURRY EQUIP. 10 DA	992.700 9927	281.600 2816	69.500 695			1343.800 1343.800	.044
1FBY 9 PLACE LAGGING 1ST.10FT 40000 SF	57770 1.444	5299 .132	30444 .761			93513 2.338	.306
1FBY 10 CLEAN&PATCH SPTC WALL 220 DA	86451 392.959	19395 88.159	6972 31.691			112818 512.809	.369
1FBY ITEM GROUND SUPPORT WALL 31111 SY	979761 31.492	561375 18.044	3768699 121.137			5309835 170.674	17.350
1GEQ 1 SET BRACING LEVEL NO 2 1377 TON	104772 76.087	30562 22.195	695834 505.326			831168 603.608	2.716
1GEQ 2 PRESTRESS LEVEL NO 2 1377 TON	24134 17.527	563 .409	1689 1.227			26386 19.162	.086
1GEQ 3 SET BRACING LEVEL NO 3 1657 TON	117661 71.008	34322 20.713	836736 504.970			988719 596.692	3.231
1GEQ 4 PRESTRESS LEVEL NO 3 1657 TON	27102 16.356	632 .381	1897 1.145			29631 17.882	.097

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 5-1JY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1GEQ 5 SET BRACING LEVEL NO 4 1651 TON	117236 71.009	34198 20.714	833707 504.971			985141 596.694	3.219
1GEQ 6 PRESTRESS LEVEL NO 4 1651 TON	27004 16.356	630 .382	1890 1.145			29524 17.882	.096
1GEQ 7 SET BRACING LEVEL NO 5 1310 TON	99681 76.092	29077 22.196	661978 505.327			790736 603.615	2.584
1GEQ 8 PRESTRESS LEVEL NO 5 1377 TON	24134 17.527	563 .409	1689 1.227			26386 19.162	.086
1GEQ 11 REMOVE BRACING LEVEL 5 1310 TON	38941 29.726	16356 12.485	2726 2.081			58023 44.292	.190
1GEQ 12 REMOVE BRACING LEVEL 4 1651 TON	49076 29.725	20611 12.484	3435 2.081			73122 44.290	.239
1GEQ 13 REMOVE BRACING LEVEL 3 1657 TON	49252 29.724	20685 12.483	3448 2.081			73385 44.288	.240
1GEQ 14 REMOVE BRACING LEVEL 2 1377 TON	47755 34.680	20057 14.566	3343 2.428			71155 51.674	.233
1GEQ ITEM INTERNAL BRACING 6013 TON	726748 120.863	208256 34.634	3048372 506.964			3983376 662.461	13.016
1HEQ 1 BREAK PAVEMENT & HAUL 1400 SY	33808 2.348	14069 .977	2367 .164			50244 3.489	.164

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 5-1JY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1HEQ 2 EXCAVATE FIRST 5 FT 24100 CY	130060 5.397	62830 2.607	45254 1.878			238144 9.881	.778 1HEQ 2
1HEQ 3 EXCAVATE 5 TO 22 FT 81900 CY	267546 3.267	189428 2.313	141578 1.729			598552 7.308	1.956 1HEQ 3
1HEQ 4 EXCAVATE 22 TO 30 FT 38500 CY	121167 3.147	118130 3.068	66232 1.720			305529 7.936	.998 1HEQ 4
1HEQ 5 EXCAVATE 30 TO 50 FT 96300 CY	275085 2.857	337244 3.502	163706 1.700			776035 8.059	2.536 1HEQ 5
1HEQ 6 EXCAVATE 50 TO 70 FT 96300 CY	296242 3.076	363182 3.771	165187 1.715			824611 8.563	2.694 1HEQ 6
1HEQ 7 FINE GRADE INVERT 14400 SY	77379 5.374	35489 2.465	24167 1.678			137035 9.516	.448 1HEQ 7
1HEQ ITEM EXCAVATION 337100 CY	1201287 3.564	1120372 3.324	608491 1.805			2930150 8.692	9.574 1HEQ ITEM
1IBR 1 LEVELING SLAB FORMS 20 EA	11966 598.300		3988 199.400			15954 797.700	.052 1IBR 1
1IBR 2 POUR LEVELING SLAB 1580 CY	27040 17.114	2762 1.748	1893 1.198	45954 29.085		77649 49.145	.254 1IBR 2
1IBR 3 BASE SLAB REBAR, 2648 TON	415661 156.972	29730 11.227	29096 10.988	1112160 420.000		1586647 599.187	5.184 1IBR 3

HIGHWAY TUNNEL-SITE 5-SPIC WALL-INTERNAL BRACING-70 FOOT

DOT 5-1JY

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1IBR 4	BASE SLAB BLKHDS&WK.FM 18680 SF	111766 5.983		12599 .674			124365 6.658	.406
1IBR 5	BASE SLAB-POUR,CLEANUP 35300 CY	135204 3.830	13808 .391	9464 .268	1086005 30.765		1244481 35.254	4.066
1IBR 9	ASSEM.STL.WL&RF&PL FRM 20 DA	21406 1070.300	1947 97.350	164618 8230.900			187971 9398.550	.614
1IBR 11	WALL REBAR 417 TON	86571 207.604	5364 12.863	6060 14.532	175140 420.000		273135 655.000	.892
1IBR 12	MOVE & SET STEEL FORMS 2000 LF	423539 211.770		42198 21.099			465737 232.869	1.522
1IBR 13	ROOF SLAB REBAR 1444 TON	343033 237.557	21255 14.720	24012 16.629	606480 420.000		994780 688.906	3.250
1IBR 14	POUR WALLS & ROOF SLAB 24820 CY	135204 5.447	13808 .556	9464 .381	763587 30.765		922063 37.150	3.013
1IBR 15	PLACE ROOF WATERPROOF 14400 SY					147600 10.250	147600 10.250	.482
1IBR 16	MORTAR PROT.FOR W.P. 1584 CY	50902 32.135	7308 4.614	5243 3.310	61070 38.554		124523 78.613	.407
1IBR 17	FORM PLENUM DECK 2000 LF	81576 40.788		8380 4.190			89956 44.978	.294
1IBR 18	PLEN.DECK REBAR 240 TON	60160 250.667	2650 11.042	4211 17.546	76800 320.000		143821 599.254	.470

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 5-1JY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1IBR 19	55226	9466	3866	99674		168232	.550
POUR PLENUM DECK	18.409	3.155	1.289	33.225		56.077	
3000 CY							1IBR 19
1IBR 20	20218	1261	2105	12250		35834	.117
CONST. PLENUM DIV. WALL	101.090	6.305	10.525	61.250		179.170	
200 CY							1IBR 20
1IBR 21					2.000	230000	.752
ELECTRICAL EMBEDDED							1IBR 21
1IBR 22					105000	105000	.343
MECHANICAL EMBEDDED							1IBR 22
1IBR 23	84847		5939	4900		95686	.313
PATCH&POINT CONC.WORK	.204		.014	.012		.230	
416000 SF							1IBR 23
1IBR 24	11829	662	828			13319	.044
CLEAN UP STRUCTURE	591.450	33.100	41.400			665.950	
20 DA							1IBR 24
1IBR ITEM	2076148	110021	333964	4044020	482600	7046753	23.026
CONSTRUCT PERM. STRUCT.	31.990	1.695	5.146	62.312	7.436	108.579	1IBR ITEM
64900 CY							
1JEQ 1	56256	2500	3938	38400		101094	.330
BACKFILL & TAMP 2 FT	5.860	.260	.410	4.000		10.531	
9600 CY							1JEQ 1
1JEQ 2	217278	26990	15209	385200		644677	2.107
BACKFILL & TAMP 2-22FT	2.256	.280	.158	4.000		6.694	
96300 CY							1JEQ 2
1JEQ 3	102493	12731	7175	212000		334399	1.093
BACKFILL & TMP 22-41FT	1.934	.240	.135	4.000		6.309	
53000 CY							1JEQ 3
1JEQ 4	163128	20264	11419	96400		291211	.952
BACKFILL & TMP.TOP 5FT	6.769	.841	.474	4.000		12.083	
24100 CY							1JEQ 4
1JEQ ITEM	539155	62485	37741	732000		1371381	4.481
BACKFILL	2.946	.341	.206	4.000		7.494	
183000 CY							1JEQ ITEM

DOT 5-1JY

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	PERM MATL	SUB-CONT			
1K00 1 PLACE 6IN SUBGRADE 13350 SY	13603 1.034	3800 .285	966 .072	16700 1.251			35269 2.642	.115	1K00 1
1K00 2 PLACE 4IN BASE COURSE 13350 SY	13803 1.034	3800 .285	966 .072	10680 .800			29249 2.191	.096	1K00 2
1K00 3 STREET PAVING 13350 SY					42343 3.172		42343 3.172	.138	1K00 3
1K00 5 BREAKOUT REM. SIDEWALK 5870 SY	13783 2.348	5736 .977	965 .164				20484 3.490	.067	1K00 5
1K00 6 BF&TMP.SIDEWALK VAULTS 9852 CY	66686 6.769	8283 .841	4668 .474	40000 4.060			119637 12.143	.391	1K00 6
1K00 7 PLACE 4IN SIDEWK.SUBGR 7785 SY	13416 1.723	3693 .474	939 .121	5200 .668			23248 2.986	.076	1K00 7
1K00 8 PLACE 4IN CONC.SIDEWLK 7785 SY	45719 5.873		4340 .557	27307 3.508			77366 9.938	.253	1K00 8
1K00 9 ACCESS WALKWAY 40 DA	18663 466.575	1325 33.125	5554 138.850				25542 638.550	.083	1K00 9
1K00 ITEM STREET RESTORATION 13350 SY	185873 13.923	26637 1.995	18398 1.378	99887 7.482	42343 3.172		373138 27.950	1.219	1K00 ITEM
1N00 1 FIXED EXPENSE	67200	30000	237704				334904	1.094	1N00 1
1N00 ITEM OVERHEAD-FIXED COSTS	67200	30000	237704				334904	1.094	1N00 ITEM

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 5-1JY

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
10JQ 1	OVERHEAD LABOR 39 MO	1239200 31774.359		86744 2224.205			1325944 33998.564	4.333
10JQ 2	OVERHEAD EXPENSES 39 MO			412950 10588.462			412950 10588.462	1.349
10JQ 3	GENERAL SERVICE CREW 700 DA	1057000 1510.000	89838 128.340	73990 105.700			1220828 1744.040	3.989
10JQ 4	VEHICLE OPERATION 39 MO		39000 1000.000				39000 1000.000	.127
10JQ ITEM	OVERHEAD-TIME RELATED 39 MO	2296200 58876.923	128838 3303.538	573684 14709.846			2998722 76890.308	9.798
1P00 1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	.674
1P00 ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	.674
1QJQ 1	TIME RELATED COSTS 39 MO			201600 5169.231			201600 5169.231	.659
1QJQ ITEM	PLANT-TIME RELATED 39 MO			201600 5169.231			201600 5169.231	.659

DOT 5-1JY

HIGHWAY TUNNEL-SITE 5-SPTC WALL-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	9684999	2636244	11112385	4906886	2263455	30603969	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-1LY

FOUR LANE HIGHWAY TUNNEL
SITE 1 - 70' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

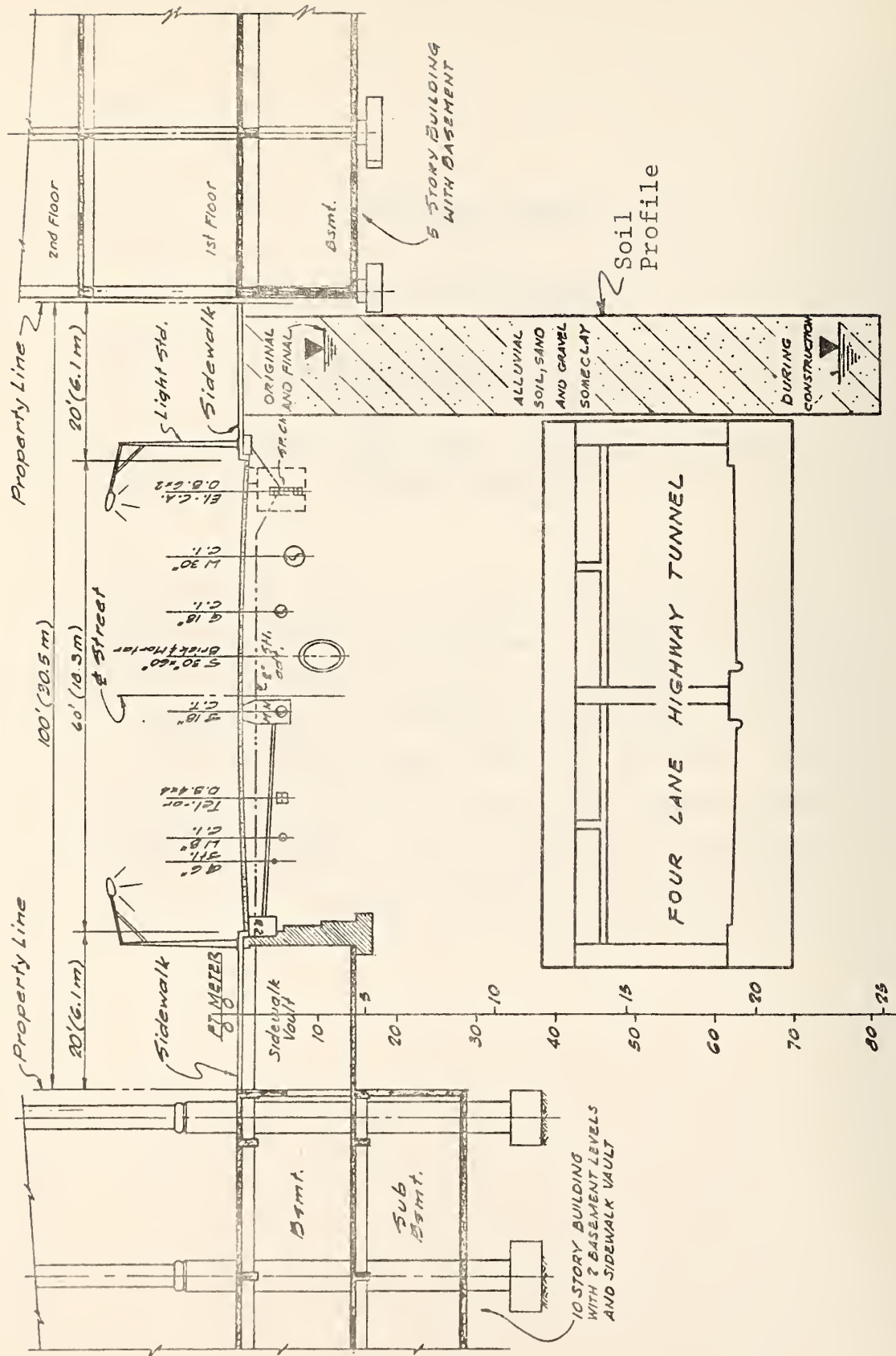


Figure 3. PROJECT 1-11Y - HIGHWAY TUNNEL
 SITE 1 - 70' DEPTH
 PRECAST CONCRETE PANELS - INTERNAL BRACING

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT			DOT 1-1LY
	TOTAL COST ANALYSIS	PROJECT SUMMARY	
	LABOR	EQPT	JOB MATL
	9174157	2404064	6257638
			6828638
			3788326
TOTAL ESTIMATE			28452823
			100.000
PROJECT			28452823
			100.000

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT		TOTAL COST ANALYSIS				PROJECT SUMMARY			DOT 1-1LY
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1A00 1	CONST. BARRICADES ETC. 45 DA	42253 938.956	1166 25.911	37713 838.067			81132 1802.933	.285	1A00 1
1A00 2	SET&MOVE BARRICADES ET 45 DA	28807 640.156	2718 60.400	5271 117.133			36796 817.689	.129	1A00 2
1A00 3	FLAGMEN-DIRECT TRAFFIC 300 DA	46416 154.720		3249 10.830			49665 165.550	.175	1A00 3
1A00 ITEM	CONTROL TRAFFIC	117476	3884	46233			167593	.589	1A00 ITEM
1BD1 1	ALL OPERATIONS	198151	18680	199450	8000	1719712	2143993	7.535	1BD1 1
1BD1 ITEM	UTILITY WORK-ALTERNATE	198151	18680	199450	8000	1719712	2143993	7.535	1BD1 ITEM
1CD0 1	GENL EXTERIOR PROTECT 40 DA	21501 537.525	6955 173.875	7550 188.750			36006 900.150	.127	1CD0 1
1CD0 2	SIDEWALK VAULTS & WALLS 1000 LF	94179 94.179	18024 18.024	21703 21.703	22979 22.979		156885 156.885	.551	1CD0 2
1CD0 ITEM	PROTECT ADJ STRUCTURES	115680	24979	29253	22979		192891	.678	1CD0 ITEM
1DD7 1	ALL OPERATIONS					1037051	1037051	3.645	1DD7 1
1DD7 ITEM	CONTROL GRNDWTR-ALT					1037051	1037051	3.645	1DD7 ITEM

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCDOT	
1E00 1	CENTER PILE EXPL HOLE 168 EA	14847 88,375	2083 12,399	4339 25,827			21269 126,601	.075	1E00 1
1E00 2	DRILL HOLES-CENTR PILE 168 EA	56098 333,917	66441 395,482	3927 23,375			126466 752,774	.444	1E00 2
1E00 3	OPERATE SLURRY EQUIP 84 SH	36657 436,393	8279 98,560	5629 67,012			50565 601,964	.178	1E00 3
1E00 4	SPLICE, PLACE, TRIM, PILE 168 EA	34065 202,768	12555 74,732	135925 809,077			182545 1086,577	.642	1E00 4
1E00 5	BACKFILL PILE HOLES 168 EA	14776 87,952	3706 22,060	16453 97,935			34935 207,946	.123	1E00 5
1E00 6	PILE CAPS, WALES, DECKBM 1906 TON	237130 124,412	51949 27,256	969599 508,709			1258678 660,377	4.424	1E00 6
1E00 7	LATERAL & SWAY BRACING 150 TON	77158 514,387	13850 92,333	110401 736,007			201409 1342,727	.708	1E00 7
1E00 8	DECK MATS & TIMBERS 15778 SY	74487 4,721	5501 .349	557444 35,330			637432 40,400	2.240	1E00 8
1E00 9	REPOST DECK SUPPORT 168 EA	81144 483,000	25140 149,643	18280 108,810			124564 741,452	.438	1E00 9
1E00 11	REMOVE TIMBER DECKING 15778 SY	35237 2,233	5443 .345	2467 .156			43147 2,735	.152	1E00 11
1E00 12	RMV. DECK BMS. & INT. PILE 1859 TON	82189 44,211	35123 18,893	5753 3,095			123065 66,200	.433	1E00 12

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1E00 13	REMOVE WALES & CAPS 450 TON	31832 70,738	13603 30,229	2228 4,951			47663 105,918	.168
1E00 14	REM.LAG.&PILES TO -6 4000 LF	31831 7,958	8611 2,153	2228 .557			42670 10,668	.150
1E00 ITEM	STREET DECKING 15778 SY	807451 51,176	252284 15,990	1834673 116,280			2894408 183,446	10.173
1FCY 1	MOB.SLURRY PLT,EQUIP. 30 DA	17083 569,433	30490 1016,333	1196 39,867			48769 1625,633	.171
1FCY 2	PRECAST YARD 170 DA	281750 1657,353	131797 775,276	19723 116,018	2137972 12576,306	491920 2893,647	3063162 18018,600	10.766
1FCY 3	TRENCH @ WALL LOCATION 4000 LF	88368 22,092	12400 3,100	77997 19,499			178765 44,691	.628
1FCY 4	EXCV SLOT FOR PANELS 36444 CY	212686 5,836	271662 7,454	14888 .409			499236 13,699	1.755
1FCY 5	SET PRE-CAST PANELS 668 EA	216890 324,686	110194 164,961	32507 48,663			359591 538,310	1.264
1FCY 6	OPERATE SLURRY EQUIP. 240 DA	314208 1309,200	70963 295,679	408210 1700,875			793381 3305,754	2.788
1FCY 7	DEMOBE.SLURRY EQUIP. 10 DA	9927 992,700	2816 281,600	695 69,500			13438 1343,800	.047

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1FCY 8 PLACE LAGGING 1ST.10FT 40000 SF	57770 1.444	5299 .132	30444 .761			93513 2.338	.329 1FCY 8
1FCY 9 CLN.PNL.& PATCH JT. 240 DA	94311 392.963	21159 88.163	15548 64.783			131018 545.908	.460 1FCY 9
1FCY ITEM GROUND SUPPORT WALL 31111 SY	1292993 41.561	656780 21.111	601208 19.325	2137972 68.721	491920 15.812	5180873 166.529	18.209 1FCY ITEM
1GEQ 1 SET BRACING LEVEL NO 2 1129 TON	98169 86.952	28636 25.364	571372 506.087			698177 618.403	2.454 1GEQ 1
1GEQ 2 PRESTRESS LEVEL NO 2 1129 TON	22612 20.028	527 .467	1583 1.402			24722 21.897	.087 1GEQ 2
1GEQ 3 SET BRACING LEVEL NO 3 1247 TON	108437 86.958	31631 25.366	631091 506.087			771159 618.411	2.710 1GEQ 3
1GEQ 4 PRESTRESS LEVEL NO 3 1247 TON	24978 20.030	582 .467	1748 1.402			27308 21.899	.096 1GEQ 4
1GEQ 5 SET BRACING LEVEL NO 4 852 TON	106775 125.323	31146 36.556	433474 508.772			571395 670.651	2.008 1GEQ 5
1GEQ 6 PRESTRESS LEVEL NO 4 852 TON	24595 28.867	573 .673	1722 2.021			26890 31.561	.095 1GEQ 6
1GEQ 7 SET BRACING LEVEL NO 5 852 TON	106775 125.323	31146 36.556	433474 508.772			571395 670.651	2.008 1GEQ 7

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
1GEQ 8 PRESTRESS LEVEL NO 5 852 TON	24595 28.867	573 .673	1722 2.021			26890 31.561	.095	1GEQ 8	
1GEQ 11 REMOVE BRACING LEVEL 5 852 TON	41231 48.393	17317 20.325	2886 3.387			61434 72.106	.216	1GEQ 11	
1GEQ 12 REMOVE BRACING LEVEL 4 852 TON	41231 48.393	17317 20.325	2886 3.387			61434 72.106	.216	1GEQ 12	
1GEQ 13 REMOVE BRACING LEVEL 3 1247 TON	43249 34.682	18165 14.567	3027 2.427			64441 51.677	.226	1GEQ 13	
1GEQ 14 REMOVE BRACING LEVEL 2 1129 TON	39150 34.577	16442 14.563	2741 2.428			58333 51.668	.205	1GEQ 14	
1GEQ ITEM INTERNAL BRACING 4080 TON	681797 167.107	194055 47.563	2087726 511.698			2963578 726.367	10.416	1GEQ ITEM	
1HEQ 1 BREAK PAVEMENT & HAUL 14000 SY	32871 2.348	13680 .977	2301 .164			48852 3.489	.172	1HEQ 1	
1HEQ 2 EXCAVATE FIRST 5 FT 23300 CY	125744 5.397	60745 2.607	8802 .378			195291 8.382	.686	1HEQ 2	
1HEQ 3 EXCAVATE 5 TO 22 FT 79300 CY	201739 2.544	151609 1.912	14122 .178			367470 4.634	1.292	1HEQ 3	
1HEQ 4 EXCAVATE 22 TO 30 FT 37300 CY	91770 2.460	98949 2.653	6424 .172			197143 5.285	.693	1HEQ 4	

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 1-1LY

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1HEQ 5	EXCAVATE 30 TO 50 FT 93300 CY	198565 2.128	252277 2.704	13900 .149			464742 4.981	1.633
1HEQ 6	EXCAVATE 50 TO 70 FT 93300 CY	220637 2.365	280316 3.004	15445 .166			516398 5.535	1.815
1HEQ 7	FINE GRADE INVERT 14000 SY	60183 4.299	27603 1.972	4213 .301			91999 6.571	.323
1HEQ ITEM	EXCAVATION 326500 CY	931509 2.853	885179 2.711	65207 .200			1881895 5.764	6.614
1ICR 1	LEVELING SLAB FORMS 20 EA	11966 598.300		3988 199.400			15954 797.700	.056
1ICR 2	POUR LEVELING SLAB 1540 CY	27040 17.558	2762 1.794	1893 1.229	45982 29.858		77677 50.440	.273
1ICR 3	BASE SLAB REBAR, 2648 TON	415661 156.972	29730 11.227	29096 10.988	1112160 420.000		1586647 599.187	5.576
1ICR 4	BASE SLAB BLKHDS&WK.FM 18680 SF	111766 5.983		12599 .674			124365 6.658	.437
1ICR 5	BASE SLAB-POUR,CLEANUP 35300 CY	135204 3.830	13808 .391	9464 .268	1086005 30.765		1244481 35.254	4.374
1ICR 9	ASSEM.STL.WL&RF&PL FRM 15 DA	16055 1070.333	1460 97.333	137124 9141.600			154639 10309.267	.543

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LA80R	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1ICR 11 WALL REBAR 203 TON	62004 305.438	3842 18.926	4340 21.379	85260 420.000		155446 765.744	.546 1ICR 11
1ICR 12 MOVE & SET STEEL FORMS 2000 LF	423539 211.770		42198 21.099			465737 232.869	1.637 1ICR 12
1ICR 13 ROOF SLAB REBAR 1444 TON	343033 237.557	21255 14.720	24012 16.629	606480 420.000		994780 688.906	3.496 1ICR 13
1ICR 14 POUR WALLS & ROOF SLAB 21960 CY	135204 6.157	13808 .629	9464 .431	662737 30.179		821213 37.396	2.886 1ICR 14
1ICR 15 PLACE ROOF WATERPROOF 14000 SY					143500 10.250	143500 10.250	.504 1ICR 15
1ICR 16 MORTAR PROT. FOR W.P. 1540 CY	25707 16.693	3691 2.397	3479 2.259	59667 38.745		92544 60.094	.325 1ICR 16
1ICR 17 FORM PLENUM DECK 2000 LF	81576 40.788		8380 4.190			89956 44.978	.316 1ICR 17
1ICR 18 PLEN.DECK REBAR 240 TON	60160 250.667	2650 11.042	4211 17.546	76800 320.000		143821 599.254	.505 1ICR 18
1ICR 19 POUR PLENUM DECK 3000 CY	55226 18.409	9466 3.155	3866 1.289	99674 33.225		168232 56.077	.591 1ICR 19
1ICR 20 CONST.PLENUM DIV. WALL 200 CY	20218 101.090	1261 6.305	2105 10.525	12250 61.250		35834 179.170	.126 1ICR 20
1ICR 21 ELECTRICAL EMBEDDED					230000	230000	.808 1ICR 21

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT	
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT					
1ICR 22 MECHANICAL EMBEDDED							105000	105000	.369	11CR 22
1ICR 23 PATCH&POINT CONC.WORK 339000 SF	69143 .204		4840 .014	3985 .012			77968 .230	77968 .230	.274	11CR 23
1ICR 24 CLEAN UP STRUCTURE 20 DA	11829 591.450	662 33.100	828 41.400				13319 665.950	13319 665.950	.047	11CR 24
1ICR ITEM CONSTRUCT PERM.STRUCT. 62000 CY	2005331 32.344	104395 1.684	301887 4.869	3851000 62.113	478500 7.718		6741113 108.728	6741113 108.728	23.692	11CR ITEM
1JEQ 1 BACKFILL & TAMP 2 FT 9300 CY	54498 5.860	2422 .260	3815 .410	37200 4.000			97935 10.531	97935 10.531	.344	1JEQ 1
1JEQ 2 BACKFILL & TAMP 2-22FT 93300 CY	210510 2.256	26150 .280	14736 .158	373200 4.000			624596 6.694	624596 6.694	2.195	1JEQ 2
1JEQ 3 BACKFILL & TMP 22-41FT 51300 CY	99217 1.934	12324 .240	6945 .135	205200 4.000			323686 6.310	323686 6.310	1.138	1JEQ 3
1JEQ 4 BACKFILL & TMP.TOP 5FT 23300 CY	157713 6.769	19591 .841	11040 .474	93200 4.000			281544 12.083	281544 12.083	.990	1JEQ 4
1JEQ ITEM BACKFILL 177200 CY	521938 2.945	60487 .341	36536 .206	708800 4.000			1327761 7.493	1327761 7.493	4.667	1JEQ ITEM
1K00 1 PLACE 6IN SUBGRADE 13350 SY	13803 1.034	3800 .285	966 .072	16700 1.251			35269 2.642	35269 2.642	.124	1K00 1

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
1K00 2 PLACE 4IN BASE COURSE 13350 SY	13803 1.034	3900 .285	966 .072	10680 .800			29249 2.191	.103	1K00 2
1K00 3 STREET PAVING 13350 SY					42343 3.172		42343 3.172	.149	1K00 3
1K00 5 BREAKOUT REM. SIDEWALK 5870 SY	13783 2.348	5736 .977	965 .164				20484 3.490	.072	1K00 5
1K00 6 BF&TMP.SIDEWALK VAULTS 9852 CY	66686 6.769	8283 .841	4668 .474	40000 4.060			119637 12.143	.420	1K00 6
1K00 7 PLACE 4IN SIDEWK.SUBGR 7785 SY	13416 1.723	3693 .474	939 .121	5200 .668			23248 2.986	.082	1K00 7
1K00 8 PLACE 4IN CONC.SIDEWLK 7785 SY	45719 5.873		4340 .557	27307 3.508			77366 9.938	.272	1K00 8
1K00 9 ACCESS WALKWAY 40 DA	18663 466.575	1325 33.125	5554 138.850				25542 638.550	.090	1K00 9
1K00 ITEM STREET RESTORATION 13350 SY	185873 13.923	26637 1.995	18398 1.378	99887 7.482	42343 3.172		373138 27.950	1.311	1K00 ITEM
1N00 1 FIXED EXPENSE	67200	30000	226204				323404	1.137	1N00 1
1N00 ITEM OVERHEAD-FIXED COSTS	67200	30000	226204				323404	1.137	1N00 ITEM
10LQ 1 OVERHEAD LABOR 37 MO	1169400 31605.405		81858 2212.378				1251258 33817.784	4.398	10LQ 1

HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
10LQ 2	OVERHEAD EXPENSES 37 MD			388850 10509.459			388850 10509.459	1.367
10LQ 3	GENERAL SERVICE CREW 660 DA	996598 1509.997	84704 128.339	69762 105.700			1151064 1744.036	4.046
10LQ 4	VEHICLE OPERATION 37 MD		37000 1000.000				37000 1000.000	.130
10LQ ITEM	OVERHEAD-TIME RELATED 37 MD	2165998 58540.486	121704 3289.297	540470 14607.297			2828172 76437.081	9.940
1P00 1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	.725
1P00 ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	.725
1QLQ 1	TIME RELATED COSTS 37 MD			190600 5151.351			190600 5151.351	.670
1QLQ ITEM	PLANT-TIME RELATED 37 MD			190600 5151.351			190600 5151.351	.670

HIGHWAY TUNNEL-SITE 1--PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 1-1LY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	9174157	2404064	6257638	6828638	3788326	28452823	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 3-1KY

FOUR LANE HIGHWAY TUNNEL
SITE 3 - 70' DEPTH
CAST-IN-SLURRY CONCRETE (SPTC) GROUND SUPPORT
TIEBACK BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

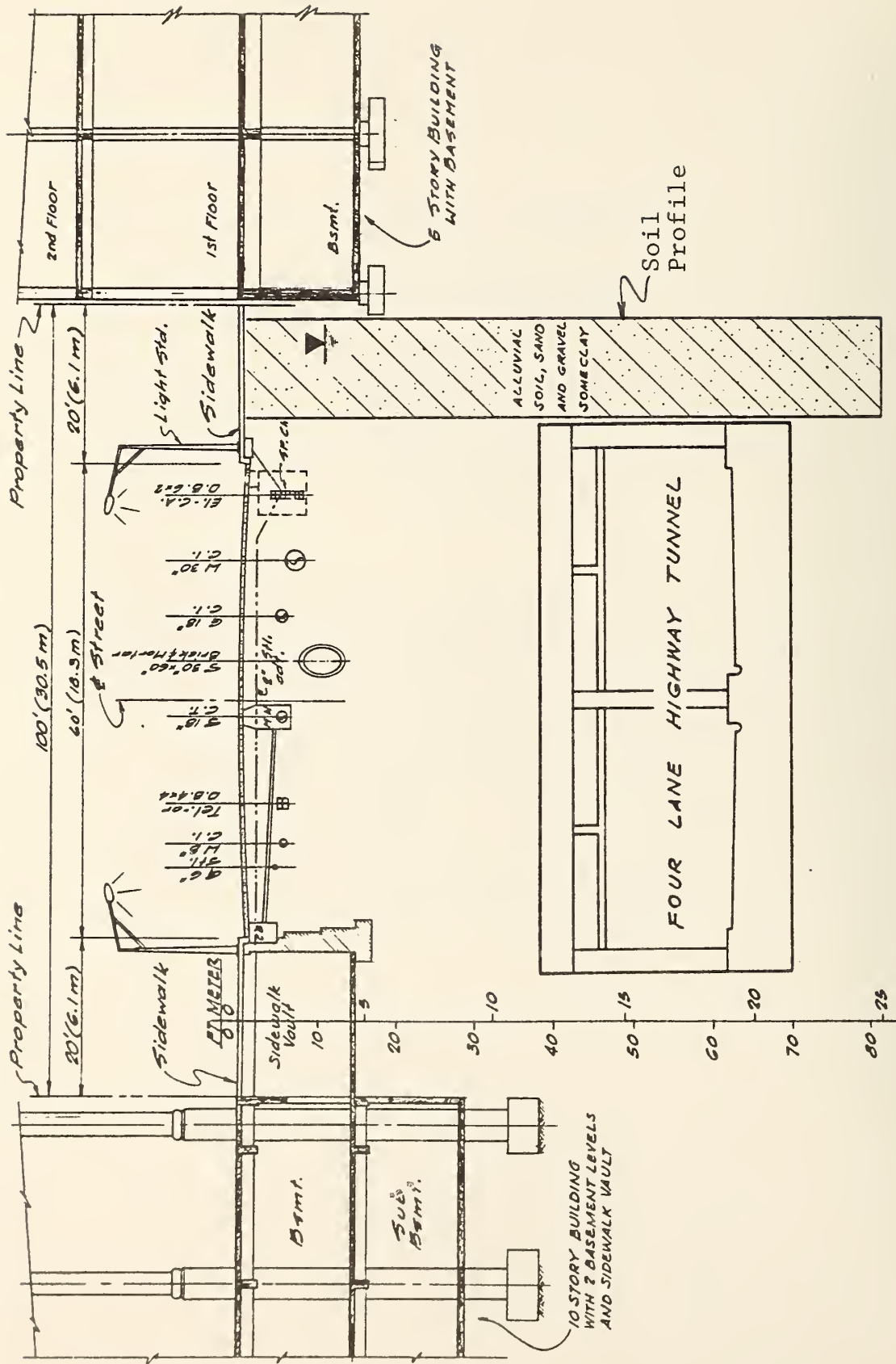


Figure 4. PROJECT 3-1KY - HIGHWAY TUNNEL
 SITE 3 - 70' DEPTH
 CAST-IN-SLURRY (SPTC) - TIEBACK BRACING

DOT 3-1KY

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

TOTAL COST ANALYSIS		PROJECT SUMMARY				
LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
10025265	2969113	8186201	4926086	3354063	29460728	100.000

TOTAL ESTIMATE

PROJECT

29460728 100.000

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1A00 1	CONST. BARRICADES ETC. 45 DA	42253 938.956	1166 25.911	37713 838.067		81132 1802.933	.275 1A00 1
1A00 2	SET&MOVE BARRICADES ET 45 DA	28807 640.156	2718 60.400	5271 117.133		36796 817.689	.125 1A00 2
1A00 3	FLAGMEN-DIRECT TRAFFIC 300 DA	46416 154.720		3249 10.830		49665 165.550	.169 1A00 3
1A00	ITEM CONTROL TRAFFIC	117476	3884	46233		167593	.569 1A00 ITEM
1800 21	UTILITY SUPPORT LONG. 2000 LF	89387 44.694	11040 5.520	88139 44.070		188566 94.283	.640 1800 21
1800 22	UTILITY SUPPORT INTER. 4 EA	41209 10302.250	2120 530.000	32429 8107.250		75758 18939.500	.257 1800 22
1800 23	STORM DR&SEW. TEMP. LONG 4000 LF	44693 11.173	5520 1.380	39129 9.782		89342 22.336	.303 1800 23
1800 24	STORM DR&SEW. PERM. LONG 4000 LF				180000 45.000	180000 45.000	.611 1800 24
1800 26	SEWER PERM. LONGIT. 4000 LF				49200 12.300	49200 12.300	.167 1800 26
1800 28	SEW. 18IN PERM. INTER. 4 EA				7380 1845.000	7380 1845.000	.025 1800 28
1800 30	STM. DR. LATER. PERM. LONG 8 EA				2400 300.000	2400 300.000	.008 1800 30

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1BD0 32 STM-DR.LATER.PERM.INT. 8 EA					2400 300.000	2400 300.000	.008 1BD0 32
1BD0 33 BLDG.SEW.LATERALS PERM 55 EA					3667 66.673	3667 66.673	.012 1BD0 33
1BD0 35 MANHOLES SEW.PERM.LONG 8 EA					9200 1150.000	9200 1150.000	.031 1BD0 35
1BD0 37 MANHOLES SEW.PERM.INT. 4 EA					4600 1150.000	4600 1150.000	.016 1BD0 37
1BD0 38 CATCH BASINS LONGIT. 8 EA					7600 950.000	7600 950.000	.026 1BD0 38
1BD0 39 CATCH BASINS INTER. 8 EA					7600 950.000	7600 950.000	.026 1BD0 39
1BD0 40 DIVERT 18IN SEWER INT. 4 EA					55904 13976.000	55904 13976.000	.190 1BD0 40
1BD0 41 WAT.MAIN 30IN CI LONG. 2000 LF					200000 100.000	200000 100.000	.679 1BD0 41
1BD0 42 WATER 8IN LONGITUDINAL 2000 LF					70300 35.150	70300 35.150	.239 1BD0 42
1BD0 43 WATER 8IN INTERSECTION 4 EA					23817 5954.250	23817 5954.250	.081 1BD0 43
1BD0 44 RELOCATE FIRE HYD.LONG 4 EA					10000 2500.000	10000 2500.000	.034 1BD0 44

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1800 45	RELOCATE FIRE HYD. INT. B EA				20000 2500.000	20000 2500.000	.06B 1800 45
1800 46	DIVERT BIN WATER INTER 4 EA				6212 1553.000	6212 1553.000	.021 1800 46
1800 51	GAS MAIN TEMP. LONG. 2000 LF				150000 75.000	150000 75.000	.509 1800 51
1800 52	GAS MAIN. PERM. LONG. 2000 LF				90000 45.000	90000 45.000	.305 1800 52
1800 53	GAS LINE 6IN. INTERSECT 4 EA				8145 2036.250	8145 2036.250	.02B 1800 53
1800 54	GAS LINE 6IN TEMP. LONG 2000 LF				114300 57.150	114300 57.150	.38B 1800 54
1800 55	GAS LINE 6IN LONGITUD. 2000 LF				54300 27.150	54300 27.150	.1B4 1800 55
1800 56	DIVERT 6IN GAS INTER. 4 EA				26B40 6710.000	26B40 6710.000	.091 1800 56
1800 61	TELEPH. 4X4 DUCT LONGIT 2000 LF				58500 29.250	58500 29.250	.199 1800 61
1800 62	TELEPH. 4X4 DUCT INTER. 4 EA				8775 2193.750	8775 2193.750	.030 1800 62
1800 63	TELEPHONE MANHOLE LONG 4 EA				39960 9990.000	39960 9990.000	.136 1800 63

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1BD0 64 TELEPHONE MANHOLE INT. 4 EA					39960 9990.000	39960 9990.000	.136 1BD0 64
1BD0 65 DIVERT TEL.DUCT INTER. 4 EA					171212 42803.000	171212 42803.000	.581 1BD0 65
1BD0 71 ELECT DUCT BK.2X6 LONG 2000 LF			33175 16.588			33175 16.588	.113 1BD0 71
1BD0 72 ELECT.DUCT 2X6 INTER. 4 EA			4977 1244.250			4977 1244.250	.017 1BD0 72
1BD0 73 ST.LT&TR.SIG.COND.INT. 4 EA				19000 4750.000		19000 4750.000	.064 1BD0 73
1BD0 74 STREET LIGHT TEMP.LONG 24 EA	1596 66.500		112 4.667			1708 71.167	.006 1BD0 74
1BD0 75 STREET LIGHT PERM.LONG 24 EA	1596 66.500		112 4.667	5040 210.000		6748 281.167	.023 1BD0 75
1BD0 76 TR.SIG.CONTRL.TEMP INT 4 EA				8000 2000.000		8000 2000.000	.027 1BD0 76
1BD0 77 TR.SIG.CONTRL.PERM INT 4 EA				600 150.000		600 150.000	.002 1BD0 77
1BD0 78 PED.&TRAFFIC SIG.PERM. 4 EA				4800 1200.000		4800 1200.000	.016 1BD0 78
1BD0 79 DIVERT ELECT DUCT INT. 4 EA				103000 25750.000		103000 25750.000	.350 1BD0 79

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			PCTOT	
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL			
18D0 80	DIVERT BLDG.LATER LONG 55 EA				165000 3000.000	165000 3000.000		.560	18D0 80
18D0 B1	REMOVE UTILITIES SUPP. 2000 LF	19670 9.835		1377 .689		21047 10.524		.071	18D0 81
18D0 ITEM	UTILITY WORK	198151	18680	199450	8000	1719712	2143993	7.277	18D0 ITEM
1CD0 1	GENL EXTERIOR PROTECT 40 DA	21501 537.525	6955 173.875	7550 188.750		36006 900.150		.122	1CD0 1
1CD0 2	SIDEWALK VAULTS&WALLS 1000 LF	94179 94.179	18024 18.024	21703 21.703	22979 22.979	156885 156.885		.533	1CD0 2
1CD0 ITEM	PROTECT ADJ STRUCTURES	115680	24979	29253	22979	192891		.655	1CD0 ITEM
1DDY 1	F.I.&R. PUMP SYSTEM					297829	297829	1.011	1DDY 1
1DDY 2	F.I.&R. RECHARGE SYST					294270	294270	.999	1DDY 2
1DDY 3	MAINT SYST-FIRST 6 MOS 6 MO					183219 30536.500	183219 30536.500	.622	1DDY 3
1DDY 4	MAINT SYST-AFTER 6 MOS 10 MO					315290 31529.000	315290 31529.000	1.070	1DDY 4
1DDY ITEM	CONTROL GROUNDWATER					1090608	1090608	3.702	1DDY ITEM

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1E00 1 CENTER PILE EXPL HOLE 168 EA	14847 88.375	2083 12.399	4339 25.827			21269 126.601	.072 1E00 1
1E00 2 DRILL HOLES-CENTR PILE 168 EA	56098 333.917	66441 395.482	3927 23.375			126466 752.774	.429 1E00 2
1E00 3 OPERATE SLURRY EQUIP 84 SH	36657 436.393	8279 98.560	5629 67.012			50565 601.964	.172 1E00 3
1E00 4 SPLICE, PLACE, TRIM, PILE 168 EA	34065 202.768	12555 74.732	135925 809.077			183545 1086.577	.620 1E00 4
1E00 5 BACKFILL PILE HOLES 168 EA	14776 87.952	3706 22.060	16453 97.935			34935 207.946	.119 1E00 5
1E00 6 PILE CAPS, WALES, DECKBM 1947 TON	230123 118.194	50414 25.893	989609 508.274			1270146 652.361	4.311 1E00 6
1E00 7 LATERAL & SWAY BRACING 150 TON	77158 514.387	13850 92.333	110401 736.007			201409 1342.727	.684 1E00 7
1E00 8 DECK MATS & TIMBERS 16222 SY	64961 4.005	4797 .296	572317 35.280			642075 39.581	2.179 1E00 8
1E00 9 REPOST DECK SUPPORT 168 EA	81144 483.000	25140 149.643	18280 108.810			124564 741.452	.423 1E00 9
1E00 11 REMOVE TIMBER DECKING 16222 SY	36228 2.233	5596 .345	2536 .156			44360 2.735	.151 1E00 11
1E00 12 RMV. DECK BMS. & INT. PILE 1900 TON	84002 44.212	35899 18.894	5880 3.095			125781 66.201	.427 1E00 12

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
1E00 13	REMOVE WALES & CAPS 450 TON	31832 70.738	13603 30.229	2228 4.951			47663 105.918	.162	1E00 13
1E00 14	REM.LAG.&PILES TO -6 4000 LF	31831 7.958	8611 2.153	2228 .557			42670 10.668	.145	1E00 14
1E00 ITEM	STREET DECKING 16222 SY	793722 48.929	250974 15.471	1869752 115.260			2914448 179.660	9.893	1E00 ITEM
1FBY 1	MOB.SLURRY PLT.&EQUIP. 30 DA	17083 569.433	30490 1016.333	1196 39.867			48769 1625.633	.166	1FBY 1
1FBY 2	TRENCH @ WALL LOCATION 4000 LF	88368 22.092	12400 3.100	10586 2.647			111354 27.839	.378	1FBY 2
1FBY 3	DRILL HOLES FOR PILES 34068 LF	92864 2.726	109983 3.228	6500 .191			209347 6.145	.711	1FBY 3
1FBY 4	SPLICE,PLACE,TRIM PILE 668 EA	135449 202.768	49921 74.732	1232241 1844.672			1417611 2122.172	4.812	1FBY 4
1FBY 5	EXCAV. BETWEEN PILES 45333 CY	258984 5.713	330797 7.297	18129 .400			607910 13.410	2.063	1FBY 5
1FBY 6	OPERATE SLURRY EQUIP. 480 SH	209472 436.400	47309 98.560	130513 271.902			387294 806.863	1.315	1FBY 6
1FBY 7	PLACE TREMIE CONC. 40869 CY	191350 4.680	75932 1.857	1236045 30.229			1503327 36.766	5.103	1FBY 7

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1FBY 8 DEMOB. SLURRY EQUIP. 10 DA	9927 992.700	2816 281.600	695 69.500			13438 1343.800	.046 1FBY 8
1FBY 9 PLACE LAGGING 1ST.10FT 40000 SF	57770 1.444	5299 .132	30444 .761			93513 2.338	.317 1FBY 9
1FBY 10 CLEAN&PATCH SPTC WALL 180 DA	70733 392.961	15869 88.161	5871 32.617			92473 513.739	.314 1FBY 10
1FBY ITEM GROUND SUPPORT WALL 31111 SY	1132000 36.386	680816 21.883	2672220 85.893			4485036 144.162	15.224 1FBY ITEM
1GFY 1 MOBILIZE & DEMOBILIZE 10 DA	4098 409.800	2878 287.800	287 28.700			7263 726.300	.025 1GFY 1
1GFY 2 INST. TIEBACK-LEVEL 2 109000 LF	435014 3.991	226430 2.077	346771 3.181			1008215 9.250	3.422 1GFY 2
1GFY 3 INSTALL WALE-LEVEL 2 228 TON	89829 393.987	25309 111.004	63448 278.281			178586 783.272	.606 1GFY 3
1GFY 4 INST. TIEBACK-LEVEL 3 88000 LF	175599 1.995	91402 1.039	270542 3.074			537543 5.108	1.825 1GFY 4
1GFY 5 INSTALL WALE-LEVEL 3 228 TON	89829 393.987	25309 111.004	63448 278.281			178586 783.272	.606 1GFY 5
1GFY 6 INST. TIEBACK-LEVEL 4 76000 LF	151653 1.995	78937 1.039	234556 3.086			465146 6.120	1.579 1GFY 6

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT		TOTAL COST ANALYSIS				PROJECT SUMMARY			DOT 3-1KY
		LA80R	EQPT	JOB MATL	PERM MATL	SU8-CONT	TOTAL	PCTOT	
1GFY 7	INSTALL WALE-LEVEL 4 255 TON	89859 352.388	25317 99.282	71490 280.353			186666 732.024	.634	1GFY 7
1GFY 8	INST. TIEBACK-LEVEL 5 69000 LF	137687 1.995	71668 1.039	214693 3.111			424048 6.146	1.439	1GFY 8
1GFY 9	INSTALL WALE-LEVEL 5 241 TON	90034 373.585	25367 105.257	67722 281.004			183123 759.846	.622	1GFY 9
1GFY 10	INST. TIEBACK-LEVEL 6 63000 LF	125715 1.995	65437 1.039	196682 3.122			387834 6.156	1.316	1GFY 10
1GFY 11	INSTALL WALE-LEVEL 6 241 TON	90034 373.585	25367 105.257	67722 281.004			183123 759.846	.622	1GFY 11
1GFY 12	INST. TIEBACK-LEVEL 7 51000 LF	101769 1.995	52972 1.039	160714 3.151			315455 6.185	1.071	1GFY 12
1GFY 13	INSTALL WALE-LEVEL 7 255 TON	89859 352.388	25317 99.282	71490 280.353			186666 732.024	.634	1GFY 13
1GFY 14	REMOVE WALE STEEL 1448 TON	86753 59.912	31172 21.528	6073 4.194			123998 85.634	.421	1GFY 14
1GFY ITEM BRACING - TIEBACK 456000 LF		1757732 3.855	772882 1.695	1835638 4.026			4366252 9.575	14.821	1GFY ITEM
1HFQ 1	BREAK PAVEMENT & HAUL 14400 SY	33808 2.348	14069 .977	2367 .164			50244 3.489	.171	1HFQ 1

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1HFQ 2 EXCAVATE FIRST 5 FT 24100 CY	130060 5.397	62830 2.607	9104 .378			201994 8.381	.686 1HFQ 2
1HFQ 3 EXCAVATE 5 TO 22 FT 81900 CY	208354 2.544	156579 1.912	14585 .178			379518 4.634	1.288 1HFQ 3
1HFQ 4 EXCAVATE 22 TO 70 FT 231100 CY	409857 1.774	520721 2.253	28690 .124			959268 4.151	3.256 1HFQ 4
1HFQ 5 FINE GRADE INVERT 14400 SY	61902 4.299	28391 1.972	4333 .301			94626 6.571	.321 1HFQ 5
1HFQ ITEM EXCAVATION 337100 CY	843981 2.504	782590 2.322	59079 .175			1685650 5.000	5.722 1HFQ ITEM
1IBR 1 LEVELING SLAB FORMS 20 EA	11966 598.300		3988 199.400			15954 797.700	.054 1IBR 1
1IBR 2 POUR LEVELING SLAB 1580 CY	27040 17.114	2762 1.748	1893 1.198	45954 29.085		77649 49.145	.264 1IBR 2
1IBR 3 BASE SLAB REBAR, 2648 TON	415661 156.972	29730 11.227	29096 10.988	1112160 420.000		1586647 599.187	5.386 1IBR 3
1IBR 4 BASE SLAB BLKHDS&WK. FM 18680 SF	111766 5.983		12599 .674			124365 6.658	.422 1IBR 4
1IBR 5 BASE SLAB-POUR, CLEANUP 35300 CY	135204 3.830	13808 .391	9464 .268	1086005 30.765		1244481 35.254	4.224 1IBR 5

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1IBR 6	REBRACE ABOVE ROOFLINE 1210 TON	37597 31.072	69522 57.456			236009 195.049	.801 1IBR 6
1IBR 7	PRESTRESS REBRACE 1210 TON	692 572	207B 1.717			32459 26.826	.110 1IBR 7
1IBR 8	REMOVE REBRACE STEEL 1210 TON	17623 14.564	2937 2.427			62519 51.669	.212 1IBR 8
1IBR 9	ASSEM. STL. WL&RF&PL FRM 20 DA	1947 97.350	164618 8230.900			187971 9398.550	.638 1IBR 9
1IBR 11	WALL REBAR 417 TON	5364 12.863	6060 14.532	175140 420.000		273135 655.000	.927 1IBR 11
1IBR 12	MOVE & SET STEEL FORMS 2000 LF	423539 211.770	42198 21.099			465737 232.869	1.581 1IBR 12
1IBR 13	ROOF SLAB REBAR 1444 TON	21255 14.720	24012 16.629	606480 420.000		994780 688.906	3.377 1IBR 13
1IBR 14	POUR WALLS & ROOF SLAB 24820 CY	13808 .556	9464 .381	763587 30.765		922063 37.150	3.130 1IBR 14
1IBR 15	PLACE ROOF WATERPROOF 14400 SY				147600 10.250	147600 10.250	.501 1IBR 15
1IBR 16	MORTAR PROT. FOR W.P. 1584 CY	7308 4.614	5243 3.310	61070 38.554		124523 78.613	.423 1IBR 16
1IBR 17	FORM PLENUM DECK 2000 LF	81576 40.788	8380 4.190			89956 44.978	.305 1IBR 17

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL		
11BR 18	PLEN.DECK REBAR 240 TON	2650 11.042	4211 17.546	76800 320.000		143821 599.254	.488	11BR 18
11BR 19	POUR PLENUM DECK 3000 CY	9466 3.155	3866 1.289	99674 33.225		168232 56.077	.571	11BR 19
11BR 20	CONST.PLENUM DIV. WALL 200 CY	1261 6.305	2105 10.525	12250 61.250		35834 179.170	.122	11BR 20
11BR 21	ELECTRICAL EMBEDDED				230000	230000	.781	11BR 21
11BR 22	MECHANICAL EMBEDDED				105000	105000	.356	11BR 22
11BR 23	PATCH&POINT CONC.WORK 416000 SF	84847 .204	5939 .014	4900 .012		95686 .230	.325	11BR 23
11BR 24	CLEAN UP STRUCTURE 20 DA	11829 591.450	662 33.100	828 41.400		13319 665.950	.045	11BR 24
11BR ITEM	CONSTRUCT PERM.STRUCT. 64900 CY	2276686 35.080	165933 2.557	408501 6.294	482600 7.436	7377740 113.679	25.043	11BR ITEM
1JFQ 1	BACKFILL & TAMP 2 FT 9600 CY	56256 5.860	2500 .260	3938 .410	38400 4.000	101094 10.531	.343	1JFQ 1
1JFQ 2	BACKFILL & TMP 2-34 FT 149300 CY	132818 .890	45836 .307	9297 .062	616400 4.129	804351 5.387	2.730	1JFQ 2
1JFQ 3	BACKFILL & TMP.TOP 5FT 24100 CY	163128 6.769	20264 .841	11419 .474	96400 4.000	291211 12.083	.988	1JFQ 3
1JFQ ITEM	BACKFILL 183000 CY	352202 1.925	68600 .375	24654 .135	751200 4.105	1196656 6.539	4.062	1JFQ ITEM

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

	TOTAL COST ANALYSIS					PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT					
1K00 1	PLACE 6IN SUBGRADE 13350 SY	3800 .285	966 .072	16700 1.251		35269 2.642			.120	1K00 1
1K00 2	PLACE 4IN BASE COURSE 13350 SY	3800 .285	966 .072	10680 .800		29249 2.191			.099	1K00 2
1K00 3	STREET PAVING 13350 SY				42343 3.172	42343 3.172			.144	1K00 3
1K00 5	BREAKOUT REM. SIDEWALK 5870 SY	5736 .977	965 .164			20484 3.490			.070	1K00 5
1K00 6	BF&TMP.SIDEWALK VAULTS 9852 CY	8283 .841	4668 .474	40000 4.060		119637 12.143			.406	1K00 6
1K00 7	PLACE 4IN SIDEWK.SUBGR 7785 SY	3693 .474	939 .121	5200 .668		23248 2.986			.079	1K00 7
1K00 8	PLACE 4IN CONC.SIDEWLK 7785 SY	45719 5.873	4340 .557	27307 3.508		77366 9.938			.263	1K00 8
1K00 9	ACCESS WALKWAY 40 DA	18663 466.575	5554 138.850			25542 638.550			.087	1K00 9
1K00 ITEM	STREET RESTORATION 13350 SY	26637 1.995	18398 1.378	99887 7.482	42343 3.172	373138 27.950			1.267	1K00 ITEM
1N00 1	FIXED EXPENSE	30000	231204			328404			1.115	1N00 1
1N00 ITEM	OVERHEAD-FIXED COSTS	30000	231204			328404			1.115	1N00 ITEM

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
10KQ 1 OVERHEAD LABOR	1135400		79478			1214878	4.124
36 MO	31538.889		2207.722			33746.611	
10KQ 2 OVERHEAD EXPENSES			379800			379800	1.289
36 MO			10550.000			10550.000	
10KQ 3 GENERAL SERVICE CREW	966402	82138	67648			1116188	3.789
640 DA	1510.003	128.341	105.700			1744.044	
10KQ 4 VEHICLE OPERATION		36000				36000	.122
36 MO		1000.000				1000.000	
10KQ ITEM OVERHEAD-TIME RELATED	2101802	118138	526926			2746866	9.324
36 MO	58383.389	3281.611	14636.833			76301.833	
1P00 1 FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	.700
1P00 ITEM PLANT-FIXED COSTS	82760	25000	79793		18800	206353	.700
1QKQ 1 TIME RELATED COSTS			185100			185100	.628
36 MO			5141.667			5141.667	
1QKQ ITEM PLANT-TIME RELATED			185100			185100	.628
36 MO			5141.667			5141.667	

HIGHWAY TUNNEL-SITE 3-SPTC WALL-TIEBACK BRACING-70 FOOT

DOT 3-1KY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	10025265	2969113	8186201	4926086	3354063	29460728	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 2-2GZ

RAPID TRANSIT STATION
SITE 2 - 70' DEPTH
SOLDIER PILE & LAGGING GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

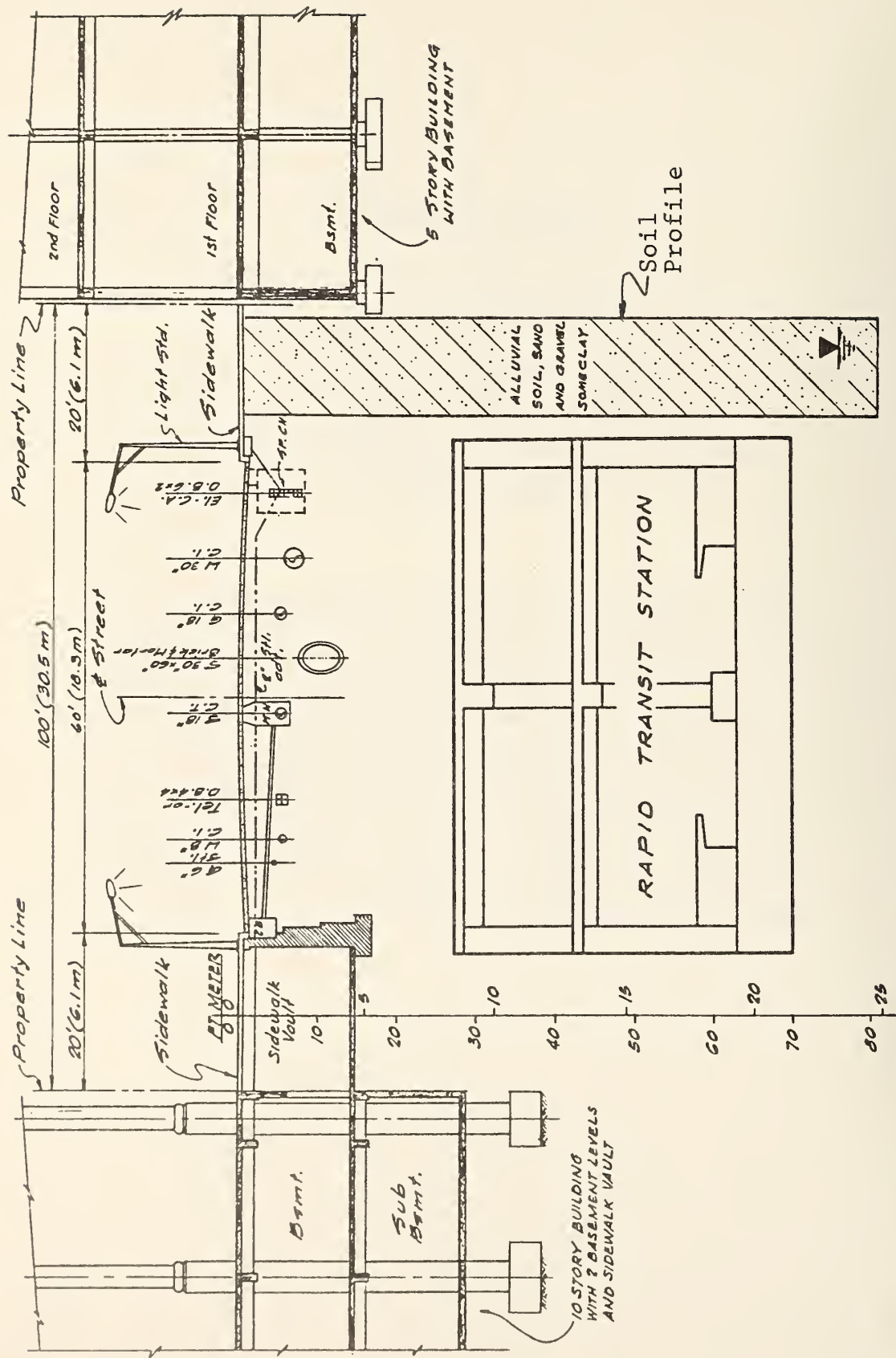


Figure 5. PROJECT 2-2GZ - TRANSIT STATION
 SITE 2 - 70' DEPTH
 SOLDIER PILES & LAGGING - INTERNAL BRACING

DOT 2-2GZ

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS		PROJECT SUMMARY				
LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
5954449	901686	3191051	2414417	751356	13212959	100.000
TOTAL ESTIMATE						
PROJECT						13212959 100.000

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2A00 1	CONST BARRICADES,ETC 20 DA	518 25.900	12245 612.250			31542 1577.100	.239 2A00 1
2A00 2	SET & MOVE BARRIC,ETC 30 DA	1812 60.400	3514 117.133			24531 817.700	.186 2A00 2
2A00 3	FLAGMEN-DIRECT TRAFFIC 250 DA	38680 154.720	2708 10.832			41388 165.552	.313 2A00 3
2A00 ITEM	TRAFFIC CONTROL	76664	18467			97461	.738 2A00 ITEM
2BA1 1	ALL OPERATIONS	65181	66321	2000	422964	562792	4.259 2BA1 1
2BA1 ITEM	UTILTY WORK-ALTERNATE	65181	66321	2000	422964	562792	4.259 2BA1 ITEM
2CAQ 1	GENL EXTERIOR PROTECT 15 DA	8063 537.533	2608 173.867	3396 226.400		14067 937.800	.106 2CAQ 1
2CAQ 2	SIDEWALK VAULTS & WALLS 350 LF	32970 94.200	6310 18.029	7798 22.280	8133 23.237	55211 157.746	.418 2CAQ 2
2CAQ 3	CONTROL PIERS 18 EA	28421 1578.944	2928 162.667	14134 785.222		45483 2526.833	.344 2CAQ 3
2CAQ 6	UNDERPIN-PREP FTGS&CON 18 EA	107884 5993.556	11620 645.556	46045 2558.056		165549 9197.167	1.253 2CAQ 6
2CAQ 7	UNDERPIN-JACK PILES 108 EA	226714 2099.204	988 9.148	44772 414.556		272474 2522.907	2.062 2CAQ 7

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2CAQ 8 UNDERPIN-PREP FTGS&CON 18 EA	107884 5993.556	11620 645.556	46045 2558.056			165549 9197.167	1.253
2CAQ 9 UNDERPIN-JACK PILES 108 EA	170036 1574.407	741 6.861	61205 566.713			231982 2147.981	1.756
2CAQ ITEM PROTECT ADJ STRUCTURES	681972	36815	223395	8133		950315	7.192
2E00 1 CENTER PILE EXPL HOLE 60 EA	5303 88.383	744 12.400	371 6.183			6418 106.967	.049
2E00 2 DRILL HOLES-CENTR PILE 60 EA	20036 333.933	23728 395.467	2523 42.050			46287 771.450	.350
2E00 3 PLACE&SPLICE CEN.PILES 60 EA	14599 243.317	5380 89.667	48762 812.700			68741 1145.683	.520
2E00 5 BACKFILL PILE HOLES 60 EA	5276 87.933	1324 22.067	5886 98.100			12486 208.100	.094
2E00 6 PILE CAPS,WALES,DECK8M 663 TON	79696 120.205	17460 26.335	337079 508.415			434235 654.955	3.286
2E00 7 LATERAL & SWAY BRACING 50 TON	25722 514.440	4617 92.340	36801 736.020			67140 1342.800	.508
2E00 8 DECK MATS & TIMBERS 5367 SY	22084 4.115	1631 .304	189391 35.288			213106 39.707	1.613
2E00 9 REPOST DECK SUPPORT 60 EA	28981 483.017	8978 149.633	6529 108.817			44488 741.467	.337

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2E00 11 REMOVE TIMBER DECKING 5367 SY	12343 2.300	1907 .355	864 .161			15114 2.816	.114 2E00 11
2E00 12 REMOVE DECK BEAMS 622 TON	27502 44.215	11753 18.895	1925 3.095			41180 66.206	.312 2E00 12
2E00 13 REMOVE WALES & CAPS 168 TON	11884 70.738	5079 30.232	832 4.952			17795 105.923	.135 2E00 13
2E00 14 REM.LAG.& PILES TO -6 1400 LF	11139 7.956	3014 2.153	780 .557			14933 10.666	.113 2E00 14
2E00 ITEM STREET DECKING 5367 SY	264565 49.295	85615 15.952	631743 117.709			981923 182.956	7.432 2E00 ITEM
2FAQ 1 TRENCH FOR SOLD PILES 1400 LF	30927 22.091	4340 3.100	4365 3.118			39632 28.309	.300 2FAQ 1
2FAQ 2 DRILL HOLES FOR PILES 14432 LF	30120 2.087	35673 2.472	7183 .498			72976 5.057	.552 2FAQ 2
2FAQ 3 SPLICE,PLACE,TRIM PILE 176 EA	35685 202.756	13152 74.727	262758 1492.943			311595 1770.426	2.358 2FAQ 3
2FAQ 4 BACKFILL PILE HOLES 176 EA	11609 65.960	2912 16.545	16123 91.608			30644 174.114	.232 2FAQ 4
2FAQ 5 PLACE LAGGING 98000 SF	117936 1.203	10818 .110	88336 .901			217090 2.215	1.643 2FAQ 5

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2FAQ 21	21231	6066	34849			62146	.470
END BULKHEADS	21.000	6.000	34.470			61.470	
1011 SY							
2FAQ ITEM	247508	72961	413614			734083	5.556
GROUND SUPPORT WALL	20.799	6.131	34.757			61.688	
11900 SY							
2GEQ 1	40200	11726	178314			230240	1.743
BRACING LEVEL 2	114.530	33.407	508.017			655.954	
351 TON							
2GEQ 2	18519	432	1296			20247	.153
PRESTRESS LEVEL 2	52.761	1.231	3.692			57.684	
351 TON							
2GEQ 3	87240	25448	6107	573300		692095	5.238
BRACING LEVEL 3	106.520	31.072	7.457	700.000		845.049	
819 TON							
2GEQ 4	20095	468	1407			21970	.166
PRESTRESS LEVEL 3	24.536	.571	1.718			26.825	
819 TON							
2GEQ 5	44738	13050	3132	235200		296120	2.241
BRACING LEVEL 4	133.149	38.839	9.321	700.000		881.310	
336 TON							
2GEQ 6	10306	240	721			11267	.085
PRESTRESS LEVEL 4	30.673	.714	2.146			33.533	
336 TON							
2GEQ 7	37452	10924	108122			156496	1.184
BRACING LEVEL 5	177.498	51.773	512.427			741.697	
211 TON							
2GEQ 8	8627	201	604			9432	.071
PRESTRESS LEVEL 5	40.866	.953	2.863			44.701	
211 TON							

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2GEO 9 REMOVE BRAC. LEVEL 5 211 TON	11237 53.256	3278 15.536	787 3.730			15302 72.521	.116
2GEO 12 REMOVE BRAC. LEVEL 2 351 TON	18695 53.262	5454 15.538	1309 3.729			25458 72.530	.193
2GEO 21 END BULKHEAD BRACING 170 TON	29410 173.000	7310 43.000	43179 253.994	64260 378.000		144159 847.994	1.091
2GEO ITEM INTERNAL BRACING 1717 TON	326519 190.168	78531 45.737	344978 200.919	872760 508.305		1622788 945.130	12.282
2HEQ 1 BREAK PAVEMENT & HAUL 5100 SY	11973 2.348	4983 .977	838 .164			17794 3.489	.135
2HEQ 2 EXCAVATE 1ST. 5 FT. 8400 CY	45331 5.397	21899 2.607	3173 .378			70403 8.381	.533
2HEQ 3 EXCAVATE 5 TO 22 FT 28600 CY	72759 2.544	54678 1.912	5093 .178			132530 4.634	1.003
2HEQ 4 EXCAVATE 22 TO 30 FT 13500 CY	33215 2.460	35814 2.653	2325 .172			71354 5.285	.540
2HEQ 5 EXCAVATE 30 TO 50 FT 33700 CY	71722 2.128	91122 2.704	5021 .149			167865 4.981	1.270
2HEQ 6 EXCAVATE 50 TO 70 FT 33700 CY	79682 2.364	101235 3.004	5578 .166			186495 5.534	1.411

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2HEQ 7 FINE GRADE INVERT 5100 SY	21923 4.299	10054 1.971	4085 .801			36062 7.071	.273
2HEQ ITEM EXCAVATION 117900 CY	336605 2.855	319785 2.712	26113 .221			682503 5.789	5.165
2IAR 1 LEVELING SLAB FORMS 14 EA	8377 598.357		3526 251.857			11903 850.214	.090
2IAR 2 POUR LEVELING SLAB 539 CY	18929 35.119	1933 3.586	1325 2.458	15789 29.293		37976 70.456	.287
2IAR 3 BASE SLAB REBAR 613 TON	98724 161.051	7061 11.519	6911 11.274	257460 420.000		370156 603.843	2.801
2IAR 4 BASE SLAB BULKHEADS 6370 SF	35953 5.644		5113 .803			41066 6.447	.311
2IAR 5 BASE SLAB-POUR, CLEANUP 8169 CY	75702 9.267	7731 .946	5299 .649	246413 30.164		335145 41.026	2.536
2IAR 21 FORM COLUMN PEDESTAL 2436 SF	7180 2.947		1617 .664			8797 3.611	.067
2IAR 22 COL PEDESTAL REBAR 12 TON	3008 250.667	265 22.083	211 17.583	5040 420.000		8524 710.333	.065
2IAR 23 POUR COL PED& CLEANUP 15B CY	2974 18.823	208 1.316	208 1.316	4776 30.228		8166 51.684	.062

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2IAR 31 ASSEM TRACK WALL FORMS 10 DA	10704 1070.400	973 97.300	37349 3734.900			49026 4902.600	.371 2IAR 31
2IAR 33 WALL & COLUMN REBAR 185 TON	38933 210.449	2785 15.054	2725 14.730	77700 420.000		122143 660.232	.924 2IAR 33
2IAR 34 MOVE&SET TRACK WALL FM 700 LF	57710 82.443		9090 12.986			66800 95.429	.506 2IAR 34
2IAR 35 POUR TRACK WL CONC&CLN 2471 CY	39533 15.999	4038 1.634	2767 1.120	74715 30.237		121053 48.989	.916 2IAR 35
2IAR 36 ENDWALL CONC-TRACK LVL 257 CY	11308 44.000	771 3.000	2848 11.082	15677 61.000		30604 119.082	.232 2IAR 36
2IAR 41 ASSEM MEZZ SLAB FORM 15 DA	16055 1070.333	1460 97.333	81924 5461.600			99439 6629.267	.753 2IAR 41
2IAR 42 MOVE & SET MEZZ FORMS 700 LF	57710 82.443		5740 8.200			63450 90.643	.480 2IAR 42
2IAR 43 MEZZ SLAB REBAR 191 TON	41621 217.911	2977 15.586	2913 15.251	80220 420.000		127731 668.749	.967 2IAR 43
2IAR 44 POUR MEZZ SLAB 2541 CY	39222 15.436	4006 1.577	2746 1.081	76766 30.211		122740 48.304	.929 2IAR 44
2IAR 51 MOVE&REASSEMBLE WL FMS 10 DA	10704 1070.400	973 97.300	5749 574.900			17426 1742.600	.132 2IAR 51
2IAR 53 WALL & COLUMN REBAR 112 TON	27654 246.911	1978 17.661	1936 17.286	47040 420.000		78608 701.857	.595 2IAR 53

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT

DOT 2-2GZ

	TOTAL COST ANALYSIS				PROJECT SUMMARY			
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2IAR 54	MOVE&SET MEZZ WALL FMS 700 LF	57710 82.443		8460 12.086		66170 94.529	.501	2IAR 54
2IAR 55	POUR MEZZ WL CONC & CLN 1498 CY	37790 25.227	3859 2.576	2645 1.766	45122 30.121	89416 59.690	.677	2IAR 55
2IAR 56	ENDWALL CONC-MEZZ LEVL 181 CY	7964 44.000	543 3.000	2005 11.077	11041 61.000	21553 119.077	.163	2IAR 56
2IAR 61	ASSEM ROOF SLAB FORM 15 DA	16055 1070.333	1460 97.333	36924 2461.600		54439 3629.267	.412	2IAR 61
2IAR 62	MOVE & SET ROOF FORMS 700 LF	57710 82.443		5100 7.286		62810 89.729	.475	2IAR 62
2IAR 63	ROOF SLAB REBAR 253 TON	52067 205.798	3724 14.719	3645 14.407	106260 420.000	165696 654.925	1.254	2IAR 63
2IAR 64	POUR ROOF SLAB 3367 CY	37872 11.248	3867 1.149	2651 .787	101671 30.196	146061 43.380	1.105	2IAR 64
2IAR 65	PLACE ROOF WATERPROOF 5100 SY							
2IAR 66	MORTAR PROT. FOR W.P. 556 CY	18009 32.390	2586 4.651	1891 3.401	21402 38.493	52275 10.250	.396	2IAR 65
2IAR 71	FORM STA PLATFORM 33000 SF	82628 2.504		29104 .882		43888 78.935	.332	2IAR 66
2IAR 72	STA. PLATFORM REBAR 120 TON	26886 224.050		1882 15.683	50400 420.000	111732 3.386	.846	2IAR 71
						79168 659.733	.599	2IAR 72

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2IAR 73	POUR STA PLATFORM 1610 CY	11114 6.903	238 .148	778 .483	49517 30.756		61647 38.290	.467	2IAR 73
2IAR 74	FORM STATION STAIRWAYS 2400 SF	11966 4.986		3350 1.396			15316 6.382	.116	2IAR 74
2IAR 75	STATION STAIRWAY REBAR 4 TON	2023 505.750		142 35.500	1680 420.000		3845 961.250	.029	2IAR 75
2IAR 76	POUR STATION STAIRWAYS 48 CY	4142 86.292	355 7.396	290 6.042	1465 30.521		6252 130.250	.047	2IAR 76
2IAR 78	TRACK INVERT FILL CONC 700 CY	12620 18.029	1795 2.564	1513 2.161	21536 30.766		37464 53.520	.284	2IAR 78
2IAR 81	ELECTRICAL-EMBEDDED					125000	125000	.946	2IAR 81
2IAR 82	MECHANICAL-EMBEDDED					75000	75000	.568	2IAR 82
2IAR 83	MISC METALS					37500	37500	.284	2IAR 83
2IAR 91	PATCH&POINT-FORM SURF 188600 SF	38467 .204		2693 .014	2208 .012		43368 .230	.328	2IAR 91
2IAR 92	CLEANUP STRUCTURE 15 DA	8872 591.467	497 33.133	621 41.400			9990 666.000	.076	2IAR 92
2IAR ITEM	CONSTRUCT PERM STRUCT 21542 CY	1085896 50.408	56083 2.603	283691 13.169	1313898 60.992	289775 13.452	3029343 140.625	22.927	2IAR ITEM

ITEM	TOTAL COST ANALYSIS				PROJECT SUMMARY			
	LA80R	EQPT	JOB MATL	PERM MATL	SU8-CONT	TOTAL	PCTOT	
2JEQ 1	BACKFILL & TAMP. 2 FT. 3400 CY	885 .260	1395 .410	13600 4.000		35804 10.531	.271	2JEQ 1
2JEQ 2	8CKFILL&TMP. 2-22 FT. 33700 CY	9445 .280	5323 .158	134800 4.000		225608 6.695	1.707	2JEQ 2
2JEQ 3	8AKFILL&TMP. LAST 5 FT. 8400 CY	7062 .841	3980 .474	33600 4.000		101500 12.083	.768	2JEQ 3
2JEQ ITEM	8ACKFILL 45500 CY	17392 .382	10698 .235	182000 4.000		362912 7.976	2.747	2JEQ ITEM
2K00 1	STREET: 6 IN SUBGRADE 4667 SY	1330 .285	338 .072	5850 1.253		12347 2.646	.093	2K00 1
2K00 2	STREET: 4 IN BASE AC 4667 SY	1330 .285	338 .072	3750 .804		10247 2.196	.078	2K00 2
2K00 3	STREET PAVING 4667 SY				14817 3.175		.112	2K00 3
2K00 5	BREAK-OUT REM. SIDEWALK 2130 SY	2081 .977	350 .164			7432 3.489	.056	2K00 5
2K00 6	8KFL&TMP S/W VAULTS 3400 CY	2858 .841	1611 .474	14000 4.118		41483 12.201	.314	2K00 6
2K00 7	SIDEWALK: 4 IN. SUBGRADE 2825 SY	1340 .474	341 .121	1900 .673		8450 2.991	.064	2K00 7

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT	
	LA8OR	EQPT	JOB MATL	PERM MATL	SUB-CONT					
2K00 8 SIDEWALK:POUR 4IN.CONC 2825 SY	16592 5.873		2154 .762	10126 3.584			28872 10.220	.219		2K00 8
2K00 9 ACCESS WALKWAYS 16 DA	7465 466.563	530 33.125	2441 152.563				10436 652.250	.079		2K00 9
2K00 ITEM RESTORATION	66599	9469	7573	35626	14817		134084	1.015		2K00 ITEM
2N00 1 FIXED EXPENSE	100800	46000	211056				357856	2.708		2N00 1
2N00 ITEM OVERHEAD-FIXED COSTS	100800	46000	211056				357856	2.708		2N00 ITEM
20GQ 1 OVERHEAD LABOR 37 MO	1433000 38729.730		100310 2711.081				1533310 41440.811	11.605		20GQ 1
20GQ 2 OVERHEAD EXPENSES 37 MO			442500 11959.459				442500 11959.459	3.349		20GQ 2
20GQ 3 GENERAL SERVICE CREW 660 DA	996598 1509.997	84704 128.339	69762 105.700				1151064 1744.036	8.712		20GQ 3
20GQ 4 VEHICLE OPERATION 37 MO		43475 1175.000					43475 1175.000	.329		20GQ 4
20GQ ITEM OVERHEAD-TIME RELATED 37 MO	2429598 65664.811	128179 3464.297	612572 16556.000				3170349 85685.108	23.994		20GQ ITEM
2P00 1 FIXED PLANT EXPENSES	119720	29000	117480				290000	2.195		2P00 1
2P00 ITEM PLANT-FIXED COSTS	119720	29000	117480				290000	2.195		2P00 ITEM

TRANSIT STATION-SITE 2-SOLDIER PILES--INTERNAL BRACING-70 FOOT

DOT 2-2GZ

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2QGQ 1	PLANT-TIME RELATED		13200	223350			236550	1.790
	37 MO		356.757	6036.486			6393.243	
2QGQ ITEM	PLANT-TIME RELATED		13200	223350			236550	1.790
	37 MO		356.757	6036.486			6393.243	

TRANSIT STATION-SITE 2-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 2-2GZ

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	5954449	901686	3191051	2414417	751356	13212959	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 4-2JY

RAPID TRANSIT STATION
SITE 4 - 70' DEPTH
CAST-IN-SLURRY CONCRETE (SPTC) GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

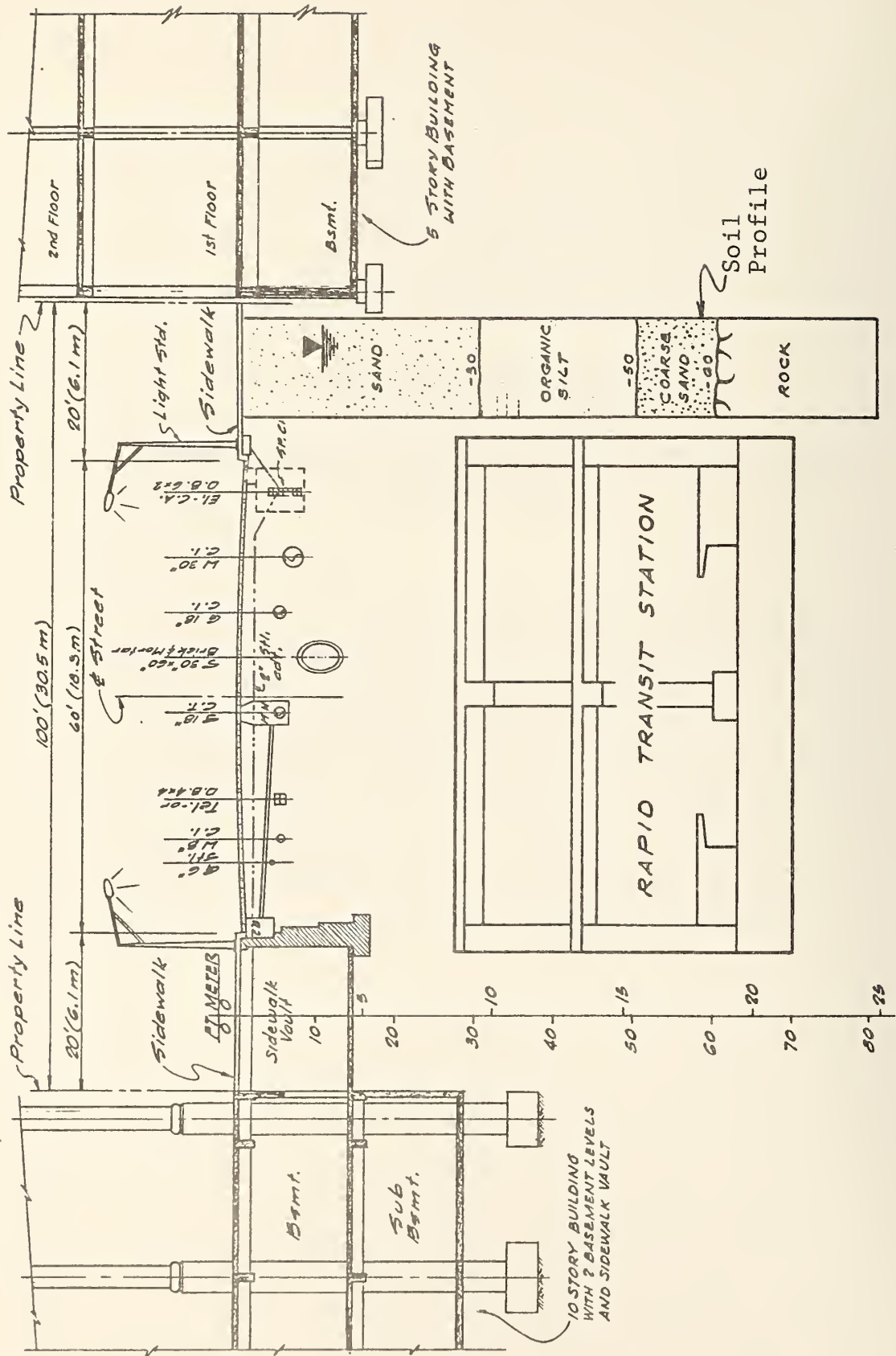


Figure 6. PROJECT 4-2JY - TRANSIT STATION
 SITE 4 - 70' DEPTH
 CAST-IN-SLURRY (SPTC) - INTERNAL BRACING

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

TOTAL COST ANALYSIS				PROJECT SUMMARY		
LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
6418224	1255798	3520567	2644679	886299	14725567	100.000

TOTAL ESTIMATE

PROJECT

14725567 100.000

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2A00 1	18779	518	12245			31542	.214
	938.950	25.900	612.250			1577.100	
2A00 2	19205	1812	3514			24531	.167
	640.167	60.400	117.133			817.700	
2A00 3	41774	2924				44698	.304
	154.719	10.830				165.548	
2A00 ITEM	79758	2330	18683			100771	.684
							2A00 ITEM
28D0 21	31285	3864	30919			66068	.449
	44.693	5.520	44.170			94.383	
28D0 22	10301	530	8107			18938	.129
							28D0 22
28D0 23	15644.	1932	13695			31271	.212
	11.174	1.380	9.782			22.336	
28D0 24					63000	63000	.428
					45.000	45.000	
28D0 26					17220	17220	.117
					12.300	12.300	
28D0 28					1845	1845	.013
							28D0 28
28D0 30					600	600	.004
					300.000	300.000	
							28D0 30

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2BD0 32 STM.DR.LATER.PERM.INT. 2 EA					600 300.000	600 300.000	.004 2BD0 32
2BD0 33 BLDG.SEW.LATERALS PERM 21 EA					1415 67.381	1415 67.381	.010 2BD0 33
2BD0 35 MANHOLES SEW.PERM.LONG 2 EA					2300 1150.000	2300 1150.000	.016 2BD0 35
2BD0 37 MANHOLES SEW.PERM.INT. 1 EA					1150	1150	.008 2BD0 37
2BD0 38 CATCH BASINS LONGIT. 2 EA					1900 950.000	1900 950.000	.013 2BD0 38
2BD0 39 CATCH BASINS INTER. 2 EA					1900 950.000	1900 950.000	.013 2BD0 39
2BD0 40 DIVERT 1BIN SEWER INT. 1 EA					13976	13976	.095 2BD0 40
2BD0 41 WAT.MAIN 30IN CI LONG. 700 LF					70000 100.000	70000 100.000	.475 2BD0 41
2BD0 42 WATER 8IN LONGITUDINAL 700 LF					24605 35.150	24605 35.150	.167 2BD0 42
2BD0 43 WATER BIN INTERSECTION 1 EA					5954	5954	.040 2BD0 43
2BD0 44 RELOCATE FIRE HYD.LONG 1 EA					2500	2500	.017 2BD0 44

DOT 4-2JY

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

PROJECT SUMMARY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2800 45	RELOCATE FIRE HYD. INT. 2 EA				5000 2500.000	5000 2500.000	.034
2800 46	DIVERT 8IN WATER INTER 1 EA				1553	1553	.011
2800 51	GAS MAIN TEMP. LONG. 700 LF				52500 75.000	52500 75.000	.357
2800 52	GAS MAIN, PERM. LONG. 700 LF				31500 45.000	31500 45.000	.214
2800 53	GAS LINE 6IN. INTERSECT 1 EA				2036	2036	.014
2800 54	GAS LINE 6IN TEMP. LONG 700 LF				40005 57.150	40005 57.150	.272
2800 55	GAS LINE 6IN LONGITUD. 700 LF				19005 27.150	19005 27.150	.129
2800 56	DIVERT 6IN GAS INTER. 1 EA				6710	6710	.046
2800 61	TELEPH. 4X4 DUCT LONGIT 700 LF				20475 29.250	20475 29.250	.139
2800 62	TELEPH. 4X4 DUCT INTER. 1 EA				2194	2194	.015
2800 63	TELEPHONE MANHOLE LONG 1 EA				9990	9990	.068

		TOTAL COST ANALYSIS			PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2BD0 64	TELEPHONE MANHOLE INT. 1 EA					9990	9990	.068
2BD0 65	DIVERT TEL.DUCT INTER. 1 EA					42B03	42B03	.291
2BD0 71	ELECT DUCT BK.2X6 LONG 700 LF			11731 16.759			11731 16.759	.080
2BD0 72	ELECT.DUCT 2X6 INTER. 1 EA			1313			1313	.009
2BD0 73	ST.LT&TR.SIG.COND.INT. 1 EA				4750		4750	.032
2BD0 74	STREET LIGHT TEMP.LONG 8 EA	533 66.625		37 4.625			570 71.250	.004
2BD0 75	STREET LIGHT PERM.LONG 8 EA	533 66.625		37 4.625		1680 210.000	2250 281.250	.015
2BD0 76	TR.SIG.CONTRL.TEMP INT 1 EA				2000		2000	.014
2BD0 77	TR.SIG.CONTRL.PERM INT 1 EA					150	150	.001
2BD0 78	PED.&TRAFFIC SIG.PERM. 1 EA					1200	1200	.008
2BD0 79	DIVERT ELECT DUCT INT. 1 EA					25750	25750	.175

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT	
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT					
2BD0 80	DIVERT BLDG.LATER LONG 21 EA				63000		63000	3000.000	.428	28D0 80
2BD0 81	REMOVE UTILITIES SUPP. 700 LF	6885 9.836		482 .689			7367 10.524		.050	28D0 81
2BD0 ITEM	UTILITY WORK	65181	6326	66321	2000	549256	689084		4.680	28D0 ITEM
2CDO 1	GENL EXTERIOR PROTECT 15 DA	8063 537.533	2608 173.867	3396 226.400			14067 937.800		.096	2CDO 1
2CDO 2	SIDEWALK VAULTS & WALLS 350 LF	32970 94.200	6310 18.029	7798 22.280	8133 23.237		55211 157.746		.375	2CDO 2
2CDO ITEM	PROTECT ADJ STRUCTURES	41033	8918	11194	8133		69278		.470	2CDO ITEM
2DDY 1	TRENCH & SUMP-EXCAV. 180 DAY	89337 496.317	18288 101.600	11504 63.911			119129 661.828		.809	2DDY 1
2DDY 2	CONSTR INVERT SUMPS 2 EA	5419 2709.500	839 419.500	792 396.000			7050 3525.000		.048	2DDY 2
2DDY 3	PUMPING FROM SUMPS 480 DAY	230999 481.248	34636 72.158	16170 33.688			281805 587.094		1.914	2DDY 3
2DDY ITEM	CONTROL GROUNDWATER	325755	53763	28466			407984		2.771	2DDY ITEM
2E00 1	CENTER PILE EXPL HOLE 60 EA	5303 88.383	744 12.400	371 6.183			6418 106.967		.044	2E00 1

' TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2E00 2 DRILL HOLES-CENTR PILE 60 EA	20036 333.933	23728 395.467	2523 42.050			46287 771.450	.314 2E00 2
2E00 3 DRILL HOLES IN ROCK 60 EA	24441 407.350	21487 358.117	6661 111.017			52589 876.483	.357 2E00 3
2E00 4 PLACE&SPlice CEN.PILES 60 EA	14599 243.317	5380 89.667	48762 812.700			68741 1145.683	.467 2E00 4
2E00 5 BACKFILL PILE HOLES 60 EA	5276 87.933	1324 22.067	5886 98.100			12486 208.100	.085 2E00 5
2E00 6 PILE CAPS, WALES, DECK 8M 703 TON	83084 118.185	18202 25.892	357316 508.273			458602 652.350	3.114 2E00 6
2E00 7 LATERAL & SWAY BRACING 50 TON	25722 514.440	4617 92.340	36801 736.020			67140 1342.800	.456 2E00 7
2E00 8 DECK MATS & TIMBERS 5911 SY	26170 4.427	1933 .327	208717 35.310			236820 40.064	1.608 2E00 8
2E00 9 REPOST DECK SUPPORT 60 EA	28981 483.017	8978 149.633	6529 108.817			44488 741.467	.302 2E00 9
2E00 11 REMOVE TIMBER DECKING 5911 SY	13202 2.233	2039 .345	924 .156			16165 2.735	.110 2E00 11
2E00 12 REMOVE DECK 8EAMS 726 TON	32096 44.209	13716 18.893	2247 3.095			48059 66.197	.326 2E00 12
2E00 13 REMOVE WALES & CAPS 157 TON	11109 70.758	4748 30.242	778 4.955			16635 105.955	.113 2E00 13

DOT 4-2JY

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
2E00 14	REM.LAG.& PILES TO ~6 1400 LF	3014 2.153	780 .557				14933 10.666	.101	2E00 14
2E00 ITEM	STREET DECKING 5911 SY	109910 18.594	678295 114.751				1089363 184.294	7.398	2E00 ITEM
2FBY 1	MOB.SLURRY PLT.&EQUIP. 30 DA	30490 1016.333	1196 39.867				48769 1625.633	.331	2FBY 1
2FBY 2	TRENCH @ WALL LOCATION 1400 LF	4340 22.091	4365 3.118				39632 28.309	.269	2FBY 2
2FBY 3	DRILL PILE HOLES-EARTH 7020 LF	22210 2.672	1313 .187				42277 6.022	.287	2FBY 3
2FBY 4	DRILL FOR PILES-ROCK 234 EA	20951 101.838	4242 18.128				49023 209.500	.333	2FBY 4
2FBY 5	SPLICE,PLACE,TRIM PILE 234 EA	17488 202.769	303181 1295.645				368117 1573.150	2.500	2FBY 5
2FBY 6	EXCAV. BETWEEN PILES 9333 CY	68698 5.763	3765 .403				126248 13.527	.857	2FBY 6
2FBY 7	OPERATE SLURRY EQUIP. 120 SH	11827 436.400	32716 272.633				96911 807.592	.658	2FBY 7
2FBY 8	PLACE TREMIE CONC. 7777 CY	14726 4.772	235301 30.256				287136 36.921	1.950	2FBY 8

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2FBY 9	DEMOSH. SLURRY EQUIP. 10 DA	9927 992.700	2816 281.600	695 69.500			13438 1343.800	.091
2FBY 10	PLACE LAGGING 1ST-10FT 14000 SF	20219 1.444	1855 .133	10655 .761			32729 2.338	.222
2FBY 11	CLEAN&PATCH SPTC WALL 200 DA	78592 392.960	17632 88.160	5849 29.245			102073 510.365	.693
2FBY 12	GROUT WALL-ROCK SEAL 1400 LF	8687 6.205	4124 2.946	23166 16.547			35977 25.698	.244
2FBY 13	ROCK FACE STABILIZED 1556 SY	37094 23.839	4603 2.958	33796 21.720			75493 48.517	.513
2FBY 21	STATION END BULKHEADS 907 SY	40815 45.000	20861 23.000	69068 76.150			130744 144.150	.888
2FBY ITEM	GROUND SUPPORT WALL 10240 SY	476638 46.547	242621 23.693	729308 71.221			1448567 141.462	9.837
2GEQ 1	BRACING LEVEL 2 398 TON	42395 106.520	12367 31.073	201968 507.457			256730 645.050	1.743
2GEQ 2	PRESTRESS LEVEL 2 398 TON	19530 49.070	455 1.143	1367 3.435			21352 53.648	.145
2GEQ 3	BRACING LEVEL 3 889 TON	94696 106.520	27623 31.072	6629 7.457	622300 700.000		751248 845.048	5.102

DOT 4-2JY

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2GEQ 4 PRESTRESS LEVEL 3 889 TON	21812 24.535	509 .573	1527 1.718			23848 26.826	.162 2GEQ 4
2GEQ 5 BRACING LEVEL 4 362 TON	48212 133.182	14064 38.851	3375 9.323	253400 700.000		319051 881.356	2.167 2GEQ 5
2GEQ 6 PRESTRESS LEVEL 4 362 TON	11106 30.680	259 .715	777 2.146			12142 33.541	.082 2GEQ 6
2GEQ 7 DRILL & CASE EARTH-L5 7488 LF	15538 2.075	5871 .784	15690 2.095			37099 4.954	.252 2GEQ 7
2GEQ 8 DRILL ROCK & INST-L5 6552 LF	32459 4.954	17711 2.703	32325 4.934			82495 12.591	.560 2GEQ 8
2GEQ 9 INSTALL WALES-LEVEL 5 44 TON	21583 490.523	6081 138.205	13291 302.068			40955 930.795	.278 2GEQ 9
2GEQ 10 REMOVE ANCHOR WALE 44 TON	2635 59.886	947 21.523	184 4.182			3766 85.591	.026 2GEQ 10
2GEQ 11 REMOVE INTERN. BRACING 398 TON	13807 34.691	5799 14.570	966 2.427			20572 51.688	.140 2GEQ 11
2GEQ 21 END BULKHEAD BRACING 130 TON	24700 190.000	6890 53.000	21489 165.300	66960 515.077		120039 923.377	.815 2GEQ 21
2GEQ ITEM INTERNAL BRACING 1823 TON	348473 191.154	98576 54.074	299588 164.338	942660 517.093		1689297 926.658	11.472 2GEQ ITEM

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

TOTAL COST ANALYSIS PROJECT SUMMARY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	
2HEQ 1 BREAK PAVEMENT & HAUL 6244 SY	14657 2.347	6100 .977	1026 .164			21783 3.489	.148 2HEQ 1
2HEQ 2 EXCAVATE FIRST 5 FT 8800 CY	47490 5.397	22941 2.607	3324 .378			73755 8.381	.501 2HEQ 2
2HEQ 3 SAND EXCAV 5 TO 22 FT 30000 CY	95400 3.180	71694 2.390	6678 .223			173772 5.792	1.180 2HEQ 3
2HEQ 4 SAND EXCAV 22 TO 30 FT 14100 CY	35253 2.500	43219 3.065	2468 .175			80940 5.740	.550 2HEQ 4
2HEQ 5 SILT EXCAV 30 TO 50 FT 35300 CY	100840 2.857	123628 3.502	60009 1.700			284477 8.059	1.932 2HEQ 5
2HEQ 6 SAND EXCAV 50 TO 60 FT 17600 CY	43991 2.499	53932 3.064	3079 .175			101002 5.739	.686 2HEQ 6
2HEQ 7 ROCK EXCAV 60 TO 70 FT 16600 CY	81559 4.913	79040 4.761	26567 1.600			187166 11.275	1.271 2HEQ 7
2HEQ 8 FINE GRADE INVERT 5000 SY	26868 5.374	12323 2.465	8444 1.689			47635 9.527	.323 2HEQ 8
2HEQ ITEM EXCAVATION 122400 CY	446058 3.644	412877 3.373	111595 .912			970530 7.929	6.591 2HEQ ITEM
21BR 1 LEVELING SLAB FORMS 14 EA	8377 598.357		3526 251.857			11903 850.214	.081 21BR 1

DOT 4-2JY

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
21BR 2	18929	1933	1325	16232		38419	.261
	34.542	3.527	2.41B	29.620		70.10B	
21BR 3	138677	9919	9707	367920		526223	3.574
	15B.307	11.323	11.0B1	420.000		600.711	
21BR 4	39B47	5227				45074	.306
	5.9B3	.7B5				6.768	
21BR 5	81205	8293	56B4	35253B		447720	3.040
	6.951	.710	.4B7	30.178		38.326	
21BR 21	71B0	1617				8797	.060
	2.947	.664				3.611	
21BR 22	300B	265	211	5040		8524	.05B
	250.667	22.0B3	17.5B3	420.000		710.333	
21BR 23	2974	208	20B	4776		8166	.055
	1B.823	1.316	1.316	30.22B		51.6B4	
21BR 31	10704	973	37349			49026	.333
	1070.400	97.300	3734.900			4902.600	
21BR 33	40749	2915	2B52	64680		111196	.755
	264.604	1B.929	18.519	420.000		722.052	
21BR 34	57710		9090			66800	.454
	82.443		12.986			95.429	
21BR 35	39194	4003	2744	59567		10550B	.716
	19.855	2.02B	1.390	30.176		53.449	

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
21BR 36	ENDWALL CONC-TRACK LVL 184 CY	19872 108.000	920 5.000	2863 15.560	11224 61.000		34879 189.560	.237	21BR 36
21BR 41	ASSEM MEZZ SLAB FORM 15 DA	16055 1070.333	1460 97.333	81924 5461.600			99439 6629.267	.675	21BR 41
21BR 42	MOVE & SET MEZZ FORMS 700 LF	57710 82.443		5740 8.200			63450 90.643	.431	21BR 42
21BR 43	MEZZ SLAB REBAR 206 TON	44898 217.951	3211 15.587	3143 15.257	86520 420.000		137772 668.796	.936	21BR 43
21BR 44	POUR MEZZ SLAB 2744 CY	39222 14.294	4006 1.460	2746 1.001	82802 30.176		128776 46.930	.875	21BR 44
21BR 51	MOVE&REASSEMBLE WL FMS 10 DA	10704 1070.400	973 97.300	5749 574.900			17426 1742.600	.118	21BR 51
21BR 53	WALL & COLUMN REBAR 48 TON	12706 264.708	909 18.938	889 18.521	20160 420.000		34664 722.167	.235	21BR 53
21BR 54	MOVE&SET MEZZ WALL FMS 700 LF	57710 82.443		8460 12.086			66170 94.529	.449	21BR 54
21BR 55	POUR MEZZ WL CONC & CLN 637 CY	39142 61.447	3998 6.276	2740 4.301	19602 30.772		65482 102.797	.445	21BR 55
21BR 56	ENDWALL CONC-MEZZ LEVL 72 CY	7776 108.000	360 5.000	1120 15.556	4392 61.000		13648 189.556	.093	21BR 56
21BR 61	ASSEM ROOF SLAB FORM 15 DA	16055 1070.333	1460 97.333	36924 2461.600			54439 3629.267	.370	21BR 61

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
21BR 62	MOVE & SET ROOF FORMS 700 LF	57710 82.443		5100 7.286			62810 89.729	.427	21BR 62
21BR 63	ROOF SLAB REBAR 272 TON	59273 217.915	4239 15.585	4149 15.254	114240 420.000		181901 668.754	1.235	21BR 63
21BR 64	POUR ROOF SLAB 3619 CY	42550 11.757	4346 1.201	2979 .823	109230 30.182		159105 43.964	1.080	21BR 64
21BR 65	PLACE ROOF WATERPROOF 5944 SY					60926 10.250		.414	21BR 65
21BR 66	MORTAR PROT. FOR W.P. 660 CY	17995 27.265	2583 3.914	1890 2.864	19889 30.135		42357 64.177	.288	21BR 66
21BR 71	FORM STA PLATFORM 33000 SF	82628 2.504		29104 .882			111732 3.386	.759	21BR 71
21BR 72	STA-PLATFORM REBAR 120 TON	26886 224.050		1882 15.683	50400 420.000		79168 659.733	.538	21BR 72
21BR 73	POUR STA PLATFORM 1610 CY	11114 6.903	238 .148	778 .483	49517 30.756		61647 38.290	.419	21BR 73
21BR 74	FORM STATION STAIRWAYS 2400 SF	11966 4.986		3350 1.396			15316 6.382	.104	21BR 74
21BR 75	STATION STAIRWAY REBAR 4 TON	2023 505.750		142 35.500	1680 420.000		3845 961.250	.026	21BR 75
21BR 76	POUR STATION STAIRWAYS 48 CY	4142 86.292	355 7.396	290 6.042	1465 30.521		6252 130.250	.042	21BR 76

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2IBR 78	12620	1795	1513	21536		37464	.254
700 CY TRACK INVERT FILL CONC	18.029	2.564	2.161	30.766		53.520	
2IBR 81					125000	125000	.849
ELECTRICAL-EMBEDDED					75000	75000	.509
2IBR 82					37500	37500	.255
MECHANICAL-EMBEDDED					48193	48193	.327
2IBR 83					.230	.230	
MISC METALS					9990	9990	.068
2IBR 91	42750	2993	2450	2450		48193	
PATCH&POINT-FORM SURF	.204	.014	.012	.012		.230	
209600 SF							
2IBR 92	8872	497	621	9990		9990	
CLEANUP STRUCTURE	591.467	33.133	41.400	666.000		666.000	
15 DA							
2IBR ITEM	1150933	59859	286629	1465860	298426	3261707	22.150
CONSTRUCT PERM STRUCT	48.004	2.497	11.955	61.139	12.447	136.040	
23976 CY							
2JEQ 1	20510	911	1436	14000		36857	.250
BACKFILL & TAMP. 2 FT.	5.860	.260	.410	4.000		10.531	
3500 CY							
2JEQ 2	79641	9893	5575	141200		236309	1.605
BCKFILL&TMP. 2-22 FT.	2.256	.280	.158	4.000		6.694	
35300 CY							
2JEQ 3	59565	7398	4170	35200		106333	.722
BAKFILL&TMP. LAST 5 FT.	6.769	.841	.474	4.000		12.083	
8800 CY							
2JEQ ITEM	159716	18202	11181	190400		379499	2.577
BACKFILL	3.355	.382	.235	4.000		7.973	
47600 CY							

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

ITEM	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	MATL			
2K00 1 STREET:6 IN SUBGRADE 4667 SY	4829 1.035	1330 .285	338 .072	5850 1.253			12347 2.646	.084	2K00 1
2K00 2 STREET:4 IN BASE AC 4667 SY	4829 1.035	1330 .285	338 .072	3750 .804			10247 2.196	.070	2K00 2
2K00 3 STREET PAVING 4667 SY					14817 3.175		14817 3.175	.101	2K00 3
2K00 5 BREAK-OUT REM.SIDEWALK 2130 SY	5001 2.348	2081 .977	350 .164				7432 3.489	.050	2K00 5
2K00 6 BKFL&TMP S/W VAULTS 3400 CY	23014 6.769	2858 .841	1611 .474	14000 4.118			41483 12.201	.282	2K00 6
2K00 7 SIDEWALK:4 IN.SUBGRADE 2825 SY	4869 1.724	1340 .474	341 .121	1900 .673			8450 2.991	.057	2K00 7
2K00 8 SIDEWALK:POUR 4IN.CONC .2825 SY	16592 5.873		2154 .762	10126 3.584			28872 10.220	.196	2K00 8
2K00 9 ACCESS WALKWAYS 16 DA	7465 466.563	530 33.125	2441 152.563				10436 652.250	.071	2K00 9
2K00 ITEM RESTORATION	66599	9469	7573	35626	14817		134084	.911	2K00 ITEM
2N00 1 FIXED EXPENSE	100800	46000	220056				366856	2.491	2N00 1
2N00 ITEM OVERHEAD-FIXED COSTS	100800	46000	220056				366856	2.491	2N00 ITEM

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
20JQ 1	OVERHEAD LABOR 41 MO	1619000 39487.805		113330 2764.146			1732330 42251.951	11.764 20JQ 1
20JQ 2	OVERHEAD EXPENSES 41 MO			493500 12036.585			493500 12036.585	3.351 20JQ 2
20JQ 3	GENERAL SERVICE CREW 740 DA	1117402 1510.003	94972 128.341	78218 105.700			1290592 1744.043	8.764 20JQ 3
20JQ 4	VEHICLE OPERATION 41 MO		48175 1175.000				48175 1175.000	.327 20JQ 4
20JQ ITEM	OVERHEAD-TIME RELATED 41 MO	2736402 66741.512	143147 3491.390	685048 16708.488			3564597 86941.390	24.207 20JQ ITEM
2P00 1	FIXED PLANT EXPENSES	119720	29000	117480		23800	290000	1.969 2P00 1
2P00 ITEM	PLANT-FIXED COSTS	119720	29000	117480		23800	290000	1.969 2P00 ITEM
2QJQ 1	PLANT-TIME RELATED 41 MO		14800 360.976	249150 6076.829			263950 6437.805	1.792 2QJQ 1
2QJQ ITEM	PLANT-TIME RELATED 41 MO		14800 360.976	249150 6076.829			263950 6437.805	1.792 2QJQ ITEM

TRANSIT STATION-SITE 4-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 4-2JY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6418224	1255798	3520567	2644679	886299	14725567	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 5-2LY

RAPID TRANSIT STATION
SITE 5 - 70' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

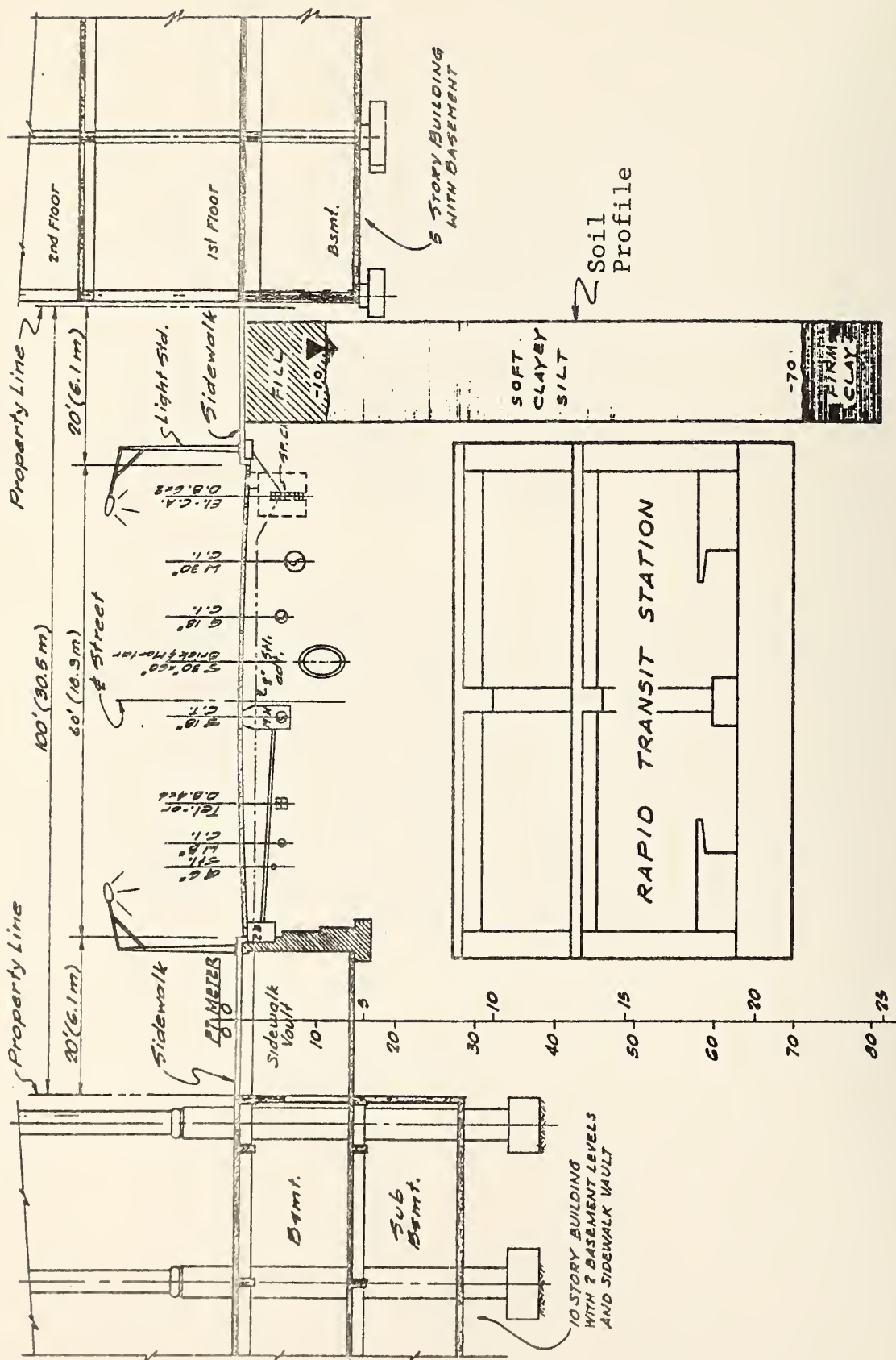


Figure 7. PROJECT 5-2LY - TRANSIT STATION
 SITE 5 - 70' DEPTH
 PRECAST CONCRETE PANELS - INTERNAL BRACING

DOT 5-2LY

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS		PROJECT SUMMARY				
LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
6075259	1250667	3192844	3409646	1098271	15026687	100.000
TOTAL ESTIMATE						

PROJECT

15026687 100.000

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2A00 1 CONST BARRICADES,ETC 20 DA	18779 938.950	518 25.900	12245 612.250			31542 1577.100	.210
2A00 2 SET & MOVE BARRIC,ETC 30 DA	19205 640.167	1812 60.400	3514 117.133			24531 B17.700	.163
2A00 3 FLAGMEN-DIRECT TRAFFIC 280 DA	43322 154.721	3033 10.832				46355 165.554	.308
2A00 ITEM TRAFFIC CONTROL	81306	2330	18792			102428	.682
28D0 21 UTILITY SUPPORT LONG. 700 LF	31285 44.693	3864 5.520	30919 44.170			66068 94.383	.440
28D0 22 UTILITY SUPPORT INTER. 1 EA	10301	530	B107			18938	.126
28D0 23 STORM DR&SEW. TEMP. LONG 1400 LF	15644 11.174	1932 1.380	13695 9.782			31271 22.336	.208
28D0 24 STORM DR&SEW. PERM. LONG 1400 LF					63000 45.000		.419
28D0 26 SEWER PERM. LONGITUD. 1400 LF					17220 12.300		.115
28D0 28 SEW. 1BIN PERM. INTER. 1 EA					1845		.012
28D0 30 STM.DR. LATER. PERM. LONG 2 EA					600 300.000		.004
						600 300.000	

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 5-2LY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
28D0 32	STM.DR.LATER.PERM.INT. 2 EA				600 300.000	600 300.000	.004 28D0 32
28D0 33	BLDG.SEW.LATERALS PERM 21 EA				1415 67.381	1415 67.381	.009 28D0 33
28D0 35	MANHOLES SEW.PERM.LONG 2 EA				2300 1150.000	2300 1150.000	.015 28D0 35
28D0 37	MANHOLES SEW.PERM.INT. 1 EA				1150	1150	.008 28D0 37
28D0 38	CATCH BASINS LONGIT. 2 EA				1900 950.000	1900 950.000	.013 28D0 38
28D0 39	CATCH BASINS INTER. 2 EA				1900 950.000	1900 950.000	.013 28D0 39
28D0 40	DIVERT 18IN SEWER INT. 1 EA				13976	13976	.093 28D0 40
28D0 41	WAT.MAIN 30IN CI LONG. 700 LF				70000 100.000	70000 100.000	.466 28D0 41
28D0 42	WATER 8IN LONGITUDINAL 700 LF				24605 35.150	24605 35.150	.164 28D0 42
28D0 43	WATER 8IN INTERSECTION 1 EA				5954	5954	.040 28D0 43
28D0 44	RELOCATE FIRE HYD.LONG 1 EA				2500	2500	.017 28D0 44

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 5-2LY

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2800 45	RELOCATE FIRE HYD. INT. 2 EA				5000 2500.000	5000 2500.000	.033
2800 46	DIVERT 8IN WATER INTER 1 EA				1553	1553	.010
2800 51	GAS MAIN TEMP. LONG. 700 LF				52500 75.000	52500 75.000	.349
2800 52	GAS MAIN.PERM.LONG. 700 LF				31500 45.000	31500 45.000	.210
2800 53	GAS LINE 6IN.INTERSECT 1 EA				2036	2036	.014
2800 54	GAS LINE 6IN TEMP.LONG 700 LF				40005 57.150	40005 57.150	.266
2800 55	GAS LINE 6IN LONGITUD. 700 LF				19005 27.150	19005 27.150	.126
2800 56	DIVERT 6IN GAS INTER. 1 EA				6710	6710	.045
2800 61	TELEPH.4X4 DUCT LONGIT 700 LF				20475 29.250	20475 29.250	.136
2800 62	TELEPH.4X4 DUCT INTER. 1 EA				2194	2194	.015
2800 63	TELEPHONE MANHOLE LONG 1 EA				9990	9990	.066

DOT 5-2LY

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
28D0 64 TELEPHONE MANHOLE INT. 1 EA					9990	9990	.066
28D0 65 DIVERT TEL.DUCT INTER. 1 EA					42803	42803	.285
28D0 71 ELECT DUCT BK.2X6 LONG 700 LF			11731 16.759			11731 16.759	.078
28D0 72 ELECT.DUCT 2X6 INTER. 1 EA			1313			1313	.009
28D0 73 ST.LI&TR.SIG.COND.INT. 1 EA				4750		4750	.032
28D0 74 STREET LIGHT TEMP.LONG 8 EA	533 66.625		37 4.625			570 71.250	.004
28D0 75 STREET LIGHT PERM.LONG 8 EA	533 66.625		37 4.625		1680 210.000	2250 281.250	.015
28D0 76 TR.SIG.CONTRL.TEMP INT 1 EA				2000		2000	.013
28D0 77 TR.SIG.CONTRL.PERM INT 1 EA					150	150	.001
28D0 78 PED.&TRAFFIC SIG.PERM. 1 EA					1200	1200	.008
28D0 79 DIVERT ELECT DUCT INT. 1 EA					25750	25750	.171

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT		TOTAL COST ANALYSIS		PROJECT SUMMARY			DOT 5-2LY	
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2800 80	DIVERT BLDG. LATER LONG 21 EA					63000 3000.000	63000 3000.000	.419
2800 81	REMOVE UTILITIES SUPP. 700 LF	6885 9.836		482 .689			7367 10.524	.049
2800 ITEM	UTILITY WORK	65181	6326	66321	2000	549256	689084	4.586
2CD0 1	GENL EXTERIOR PROTECT 15 DA	8063 537.533	2608 173.867	3396 226.400			14067 937.800	.094
2CD0 2	SIDEWALK VAULTS & WALLS 350 LF	32970 94.200	6310 18.029	7798 22.280	8133 23.237		55211 157.746	.367
2CD0 ITEM	PROTECT ADJ STRUCTURES	41033	8918	11194	8133		69278	.461
2DDY 1	TRENCH & SUMP-EXCAV. 200 DAY	99264 496.320	20320 101.600	20448 102.240			140032 700.160	.932
2DDY 2	CONSTR INVERT SUMPS 2 EA	5419 2709.500	839 419.500	792 396.000			7050 3525.000	.047
2DDY 3	PUMPING FROM SUMPS 440 DAY	211748 481.245	31750 72.159	14822 33.686			258320 587.091	1.719
2DDY ITEM	CONTROL GROUNDWATER	316431	52909	36062			405402	2.698
2E00 1	CENTER PILE EXPL HOLE 60 EA	5303 88.383	744 12.400	371 6.183			6418 106.967	.043

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2E00 2 DRILL HOLES-CENTR PILE 60 EA	20036 333.933	23728 395.467	2523 42.050			46287 771.450	.308
2E00 3 PLACE&SPlice CEN.PILES 60 EA	14599 243.317	5380 89.667	48762 812.700			68741 1145.683	.457
2E00 5 BACKFILL PILE HOLES 60 EA	5276 87.933	1324 22.067	5886 98.100			12486 208.100	.083
2E00 6 PILE CAPS,WALES,DECKBM 645 TON	76234 118.192	16701 25.893	327836 508.273			420771 652.358	2.800
2E00 7 LATERAL & SWAY BRACING 50 TON	25722 514.440	4617 92.340	36801 736.020			67140 1342.800	.447
2E00 8 DECK MATS & TIMBERS 5289 SY	21178 4.004	1564 .296	186597 35.280			209339 39.580	1.393
2E00 9 REPOST DECK SUPPORT 60 EA	28981 483.017	8978 149.633	6529 108.817			44488 741.467	.296
2E00 11 REMOVE TIMBER DECKING 5289 SY	11814 2.234	1825 .345	827 .156			14466 2.735	.096
2E00 12 REMOVE DECK BEAMS 600 TON	26526 44.210	11336 18.893	1857 3.095			39719 66.198	.264
2E00 13 REMOVE WALES & CAPS 157 TON	11109 70.758	4748 30.242	778 4.955			16635 105.955	.111
2E00 14 REM.LAG.& PILES TO -6 1400 LF	11139 7.956	3014 2.153	780 .557			14933 10.666	.099
2E00 ITEM STREET DECKING 5289 SY	257917 48.765	83959 15.874	619547 117.139			961423 181.778	6.398

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 5-2LY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
2FCY 1 M08.SLURRY PLT,EQUIP. 30 DA	17083 569.433	30490 1016.333	1196 39.867				48769 1625.633	.325	2FCY 1
2FCY 2 PRECAST YARD 60 DA	99441 1657.350	46516 775.267	6961 116.017	1012300 16871.667	206440 3440.667		1371658 22860.967	9.128	2FCY 2
2FCY 3 TRENCH @ WALL LOCATION 1400 LF	30927 22.091	4340 3.100	30615 21.868				65882 47.059	.438	2FCY 3
2FCY 4 EXCV SLOT FOR PANELS 17630 CY	107902 6.120	137821 7.817	7553 .428				253276 14.366	1.686	2FCY 4
2FCY 5 SET PRE-CAST PANELS 234 EA	75974 324.675	38601 164.962	22643 96.765				137218 586.402	.913	2FCY 5
2FCY 6 OPERATE SLURRY EQUIP. 166 DA	217327 1309.199	49083 295.681	171928 1035.711				438338 2640.590	2.917	2FCY 6
2FCY 7 DEMOBE.SLURRY EQUIP. 10 DA	9927 992.700	2816 281.600	695 69.500				13438 1343.800	.089	2FCY 7
2FCY 8 PLACE LAGGING 1ST.10FT 14000 SF	20219 1.444	1855 .133	10655 .761				32729 2.338	.218	2FCY 8
2FCY 9 CLN.PNL.& PATCH JT. 260 DA	102169 392.958	22921 88.158	16098 61.915				141188 543.031	.940	2FCY 9
2FCY 21 STATION END BULKHEADS 1011 SY	60660 60.000	30330 30.000	27499 27.200	99078 98.000	20220 20.000		237787 235.200	1.582	2FCY 21
2FCY ITEM GROUND SUPPORT WALL 11900 SY	741629 62.322	364773 30.653	295843 24.861	1111378 93.393	226660 19.047		2740283 230.276	18.236	2FCY ITEM

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2GEQ 1	BRACING LEVEL 2 438 TON	46655 106.518	13609 31.071	222266 507.457			282530 645.046	1.880 2GEQ 1
2GEQ 2	PRESTRESS LEVEL 2 438 TON	21493 49.071	501 1.144	1505 3.436			23499 53.651	.156 2GEQ 2
2GEQ 3	BRACING LEVEL 3 819 TON	87240 106.520	25448 31.072	6107 7.457	573300 700.000		692095 845.049	4.606 2GEQ 3
2GEQ 4	PRESTRESS LEVEL 3 819 TON	20095 24.536	468 .571	1407 1.718			21970 26.825	.146 2GEQ 4
2GEQ 5	BRACING LEVEL 4 336 TON	44738 133.149	13050 38.839	3132 9.321	235200 700.000		296120 881.310	1.971 2GEQ 5
2GEQ 6	PRESTRESS LEVEL 4 336 TON	10306 30.673	240 .714	721 2.146			11267 33.533	.075 2GEQ 6
2GEQ 7	BRACING LEVEL 5 416 TON	44311 106.517	12926 31.072	211102 507.457			268339 645.046	1.786 2GEQ 7
2GEQ 8	PRESTRESS LEVEL 5 416 TON	10207 24.536	238 .572	714 1.716			11159 26.825	.074 2GEQ 8
2GEQ 9	REMOVE BRAC. LEVEL 5 416 TON	22157 53.262	6463 15.536	1551 3.728			30171 72.526	.201 2GEQ 9
2GEQ 12	REMOVE BRAC. LEVEL 2 438 TON	23328 53.260	6805 15.537	1633 3.728			31766 72.525	.211 2GEQ 12
2GEQ 21	END BULKHEAD BRACING 170 TON	29410 173.000	7310 43.000	43179 253.994	64260 378.000		144159 847.994	.959 2GEQ 21
2GEQ ITEM	INTERNAL BRACING 2179 TON	359940 165.186	87058 39.953	493317 226.396	872760 400.532		1813075 832.067	12.066 2GEQ ITEM

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2HEQ 1 BREAK PAVEMENT & HAUL 4500 SY	10566 2.348	4397 .977	740 .164			15703 3.490	.105
2HEQ 2 EXCAVATE 1ST. 5 FT. 7500 CY	40477 5.397	19555 2.607	14083 1.878			74115 9.882	.493
2HEQ 3 EXCAVATE 5 TO 22 FT 25600 CY	83625 3.267	59208 2.313	44254 1.729			187087 7.308	1.245
2HEQ 4 EXCAVATE 22 TO 30 FT 12000 CY	37771 3.148	36824 3.069	20644 1.720			95239 7.937	.634
2HEQ 5 EXCAVATE 30 TO 50 FT 30100 CY	85384 2.857	105411 3.502	51169 1.700			242564 8.059	1.614
2HEQ 6 EXCAVATE 50 TO 70 FT 30100 CY	92601 3.076	113527 3.772	51632 1.715			257760 8.563	1.715
2HEQ 7 FINE GRADE INVERT 5100 SY	27408 5.374	12571 2.465	10169 1.994			50148 9.833	.334
2HEQ ITEM EXCAVATION 105300 CY	378432 3.594	351493 3.338	192691 1.830			922616 8.762	6.140
2ICR 1 LEVELING SLAB FORMS 14 EA	8377 598.357		3526 251.857			11903 850.214	.079
2ICR 2 POUR LEVELING SLAB 496 CY	18944 38.194	1934 3.899	1326 2.673	14681 29.599		36885 74.365	.245

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2ICR 3	BASE SLAB REBAR 817 TON	129343 158.315	9251 11.323	9054 11.082	343140 420.000	490788 600.720	3.266 2ICR 3
2ICR 4	BASE SLAB BULKHEADS 5880 SF	35899 6.105		4834 .822		40733 6.927	.271 2ICR 4
2ICR 5	BASE SLAB-POUR,CLEANUP 10892 CY	75714 6.951	7732 .710	5300 .487	328746 30.182	417492 38.330	2.778 2ICR 5
2ICR 21	FORM COLUMN PEDESTAL 2436 SF	7180 2.947		1617 .664		8797 3.611	.059 2ICR 21
2ICR 22	COL PEDESTAL REBAR 12 TON	3008 250.667	265 22.083	211 17.583	5040 420.000	8524 710.333	.057 2ICR 22
2ICR 23	POUR COL PED& CLEANUP 158 CY	2974 18.823	208 1.316	208 1.316	4776 30.228	8166 51.684	.054 2ICR 23
2ICR 33	LOWER COLUMN REBAR 11 TON	3008 273.455	265 24.091	211 19.182	4620 420.000	8104 736.727	.054 2ICR 33
2ICR 34	FORM LOWER COLUMNS 5046 SF	15096 2.992		3060 .606		18156 3.598	.121 2ICR 34
2ICR 35	POUR LOWER COLUMNS 140 CY	2974 21.243	208 1.486	208 1.486	4249 30.350	7639 54.564	.051 2ICR 35
2ICR 41	ASSEM MEZZ SLAB FORM 15 DA	16055 1070.333	1460 97.333	81924 5461.600		99439 6629.267	.662 2ICR 41
2ICR 42	MOVE & SET MEZZ FORMS 700 LF	57710 82.443		5740 8.200		63450 90.643	.422 2ICR 42

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 5-2LY

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCITOT
2ICR 43	MEZZ SLAB REBAR 187 TON	40749 217.909	2915 15.588	2852 15.251	78540 420.000	125056 668.749	.832 2ICR 43
2ICR 44	POUR MEZZ SLAB 2492 CY	37856 15.191	3867 1.552	2650 1.063	75213 30.182	119586 47.988	.796 2ICR 44
2ICR 53	UPPER COLUMN REBAR 6 TON	1505 250.833	132 22.000	105 17.500	2520 420.000	4262 710.333	.028 2ICR 53
2ICR 54	FORM UPPER COLUMNS 2610 SF	7808 2.992		1694 .649		9502 3.641	.063 2ICR 54
2ICR 55	POUR UPPER COLUMNS 72 CY	2974 41.306	208 2.889	208 2.889	2198 30.528	5588 77.611	.037 2ICR 55
2ICR 61	ASSEM ROOF SLAB FORM 15 DA	16055 1070.333	1460 97.333	36924 2461.600		54439 3629.267	.362 2ICR 61
2ICR 62	MOVE & SET ROOF FORMS 700 LF	57710 82.443		5100 7.286		62810 89.729	.418 2ICR 62
2ICR 63	ROOF SLAB REBAR 253 TON	55121 217.870	3943 15.585	3858 15.249	106260 420.000	169182 668.704	1.126 2ICR 63
2ICR 64	POUR ROOF SLAB 3367 CY	37940 11.268	3875 1.151	2656 .789	101671 30.196	146142 43.404	.973 2ICR 64
2ICR 65	PLACE ROOF WATERPROOF 4511 SY					46238 10.250	.308 2ICR 65
2ICR 66	MORTOR PROT. FOR W.P. 500 CY	18368 36.736	2638 5.276	1916 3.832	19373 38.746	42295 84.590	.281 2ICR 66

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 5-2LY

	TOTAL COST ANALYSIS					PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2ICR 71	FORM STA PLATFORM 33000 SF		29104 .882			111732 3.386	.744	2ICR 71
2ICR 72	STA PLATFORM REBAR 120 TON		1882 15.683		50400 420.000	79168 659.733	.527	2ICR 72
2ICR 73	POUR STA PLATFORM 1610 CY	238 .148	778 .483	49517 30.756		61647 38.290	.410	2ICR 73
2ICR 74	FORM STATION STAIRWAYS 2400 SF		3350 1.396			15316 6.382	.102	2ICR 74
2ICR 75	STATION STAIRWAY REBAR 4 TON	2023 505.750	142 35.500	1680 420.000		3845 961.250	.026	2ICR 75
2ICR 76	POUR STATION STAIRWAYS 48 CY	4142 86.292	290 6.042	1465 30.521		6252 130.250	.042	2ICR 76
2ICR 78	TRACK INVERT FILL CONC 700 CY	12620 18.029	1795 2.564	21536 30.766		37464 53.520	.249	2ICR 78
2ICR 81	ELECTRICAL-EMBEDDED				125000	125000	.832	2ICR 81
2ICR 82	MECHANICAL-EMBEDDED				75000	75000	.499	2ICR 82
2ICR 83	MISC METALS				37500	37500	.250	2ICR 83
2ICR 91	PATCH&POINT-FORM SURF 148000 SF	30187 .204	2113 .014	1724 .012		34024 .230	.226	2ICR 91
2ICR 92	CLEANUP STRUCTURE 15 DA	8872 591.467	497 33.133	621 41.400		9990 666.000	.066	2ICR 92
2ICR ITEM	CONSTRUCT PERM STRUCT 19975 CY	842806 42.193	43246 2.165	214975 10.762	283738 14.205	2602114 130.269	17.317	2ICR ITEM

DOT 5-2LY

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
2JEQ 1	BACKFILL & TAMP.2 FT. 3000 CY	7B2 .261	1231 .410	12000 4.000		31593 10.531	.210	2JEQ 1	
2JEQ 2	BCKFILL&TMP.2-22 FT. 30100 CY	B435 .2B0	4754 .158	120400 4.000		20150B 6.695	1.341	2JEQ 2	
2JEQ 3	BAKFILL&TMP.LAST 5 FT. 7500 CY	6306 .B41	3554 .474	30000 4.000		90626 12.083	.603	2JEQ 3	
2JEQ ITEM	BACKFILL 40600 CY	15523 .382	9539 .235	162400 4.000		323727 7.974	2.154	2JEQ ITEM	
2K00 1	STREET:6 IN SUBGRADE 4667 SY	1330 .2B5	338 .072	5B50 1.253		12347 2.646	.0B2	2K00 1	
2K00 2	STREET:4 IN BASE AC 4667 SY	1330 .285	33B .072	3750 .804		10247 2.196	.068	2K00 2	
2K00 3	STREET PAVING 4667 SY				14817 3.175	14B17 3.175	.099	2K00 3	
2K00 5	BREAK-OUT REM.SIDEWALK 2130 SY	2081 .977	350 .164			7432 3.4B9	.049	2K00 5	
2K00 6	BKFL&TMP S/W VAULTS 3400 CY	2B58 .B41	1611 .474	14000 4.118		414B3 12.201	.276	2K00 6	
2K00 7	SIDEWALK:4 IN.SUBGRADE 2B25 SY	1340 .474	341 .121	1900 .673		B450 2.991	.056	2K00 7	

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 5-2LY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT	
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT					
2K00 8	SIDEWALK:POUR 4IN.CONC 2825 SY	16592 5.873	2154 .762	10126 3.584	28872 10.220			28872 10.220	.192	2K00 8
2K00 9	ACCESS WALKWAYS 16 DA	7465 466.563	530 33.125	2441 152.563	10436 652.250			10436 652.250	.069	2K00 9
2K00	ITEM RESTORATION	66599	9469	7573	35626	14817		134084	.892	2K00 ITEM
2N00 1	FIXED EXPENSE	100800	46000	224056				370856	2.468	2N00 1
2N00	ITEM OVERHEAD-FIXED COSTS	100800	46000	224056				370856	2.468	2N00 ITEM
20LQ 1	OVERHEAD LABOR 39 MO	1510200 38723.077		105714 2710.615				1615914 41433.692	10.754	20LQ 1
20LQ 2	OVERHEAD EXPENSES 39 MO			469500 12038.462				469500 12038.462	3.124	20LQ 2
20LQ 3	GENERAL SERVICE CREW 700 DA	1057000 1510.000	89838 128.340	73990 105.700				1220828 1744.040	8.124	20LQ 3
20LQ 4	VEHICLE OPERATION 39 MO		45825 1175.000					45825 1175.000	.305	20LQ 4
20LQ	ITEM OVERHEAD-TIME RELATED 39 MO	2567200 65825.641	135663 3478.538	649204 16646.256				3352067 85950.436	22.307	20LQ ITEM
2P00 1	FIXED PLANT EXPENSES	119720	29000	117480				290000	1.930	2P00 1
2P00	ITEM PLANT-FIXED COSTS	119720	29000	117480				290000	1.930	2P00 ITEM

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 5-2LY

		TOTAL COST ANALYSIS			PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2QLQ 1	PLANT-TIME RELATED		14000	236250			250250	1.665
	39 MO		358.974	6057.692			6416.667	
2QLQ ITEM	PLANT-TIME RELATED		14000	236250			250250	1.665
	39 MO		358.974	6057.692			6416.667	

TRANSIT STATION-SITE 5-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 5-2LY

TOTAL COST ANALYSIS						
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	PCTOT
TOTAL ESTIMATE	6075259	1250667	3192844	3409646	1098271	15026687 100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 3-2MY

RAPID TRANSIT STATION
SITE 3 - 70' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
TIEBACK BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

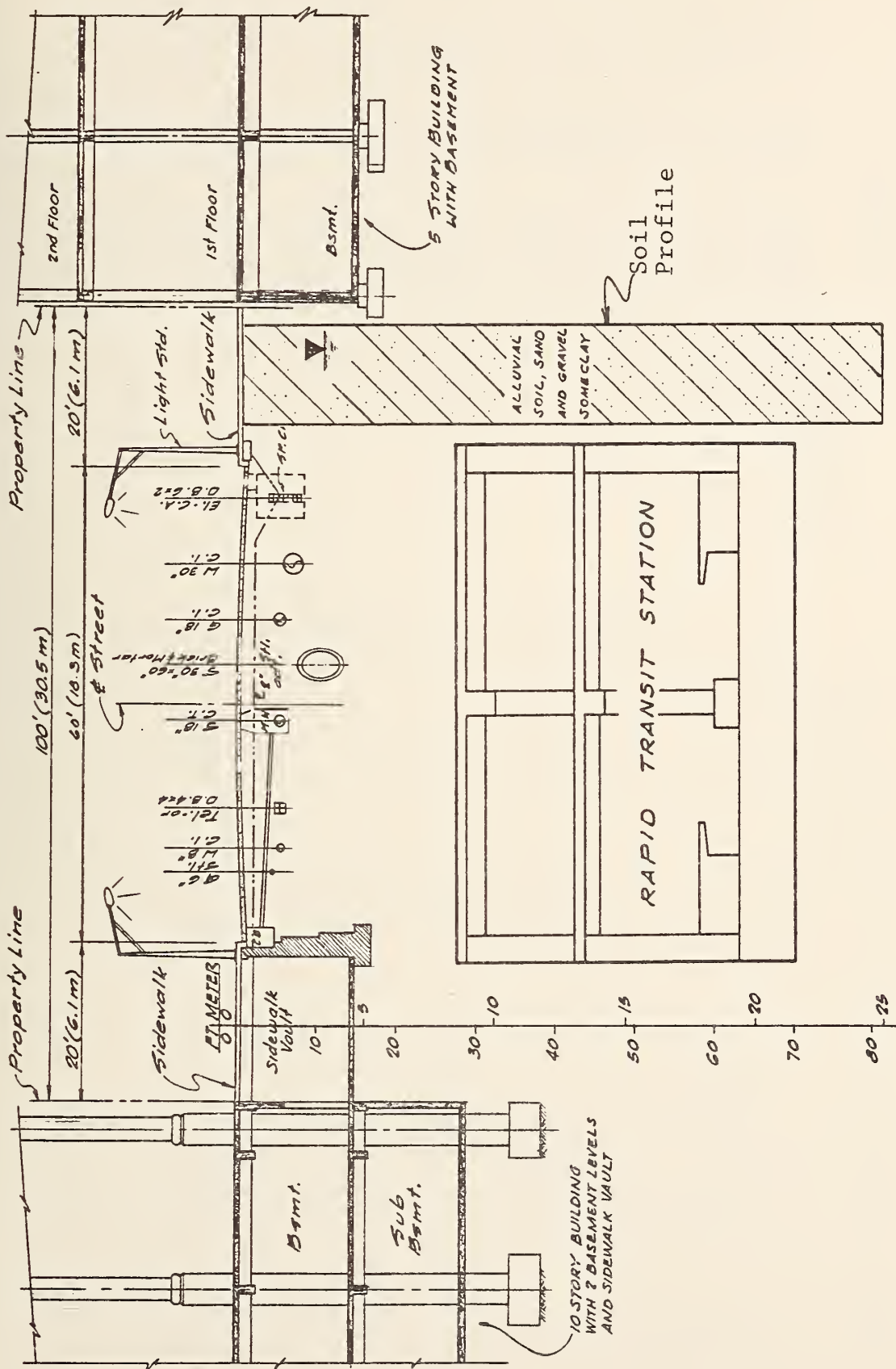


Figure 8. PROJECT 3-2MY - TRANSIT STATION
 SITE 3 - 70' DEPTH
 PRECAST CONCRETE PANELS - TIEBACK BRACING

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT		DOT 3-2MY	
TOTAL COST ANALYSIS		PROJECT SUMMARY	
LABOR	EQPT	JOB MATL	PERM MATL
5801725	1293818	3114461	3225644
			2125692
TOTAL ESTIMATE			15561340
			100.000
PROJECT		15561340	100.000

TRANSIT STATION-SITE 3-PRECAST WALL-TIESBACK BRACING-70 FOOT

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2A00 1	CONST BARRICADES, ETC 20 DA	18779 938.950	518 25.900	12245 612.250			31542 1577.100	.203	2A00 1
2A00 2	SET & MOVE BARRIC, ETC 30 DA	19205 640.167	1812 60.400	3514 117.133			24531 817.700	.158	2A00 2
2A00 3	FLAGMEN-DIRECT TRAFFIC 250 DA	38680 154.720		2708 10.832			41388 165.552	.266	2A00 3
2A00	ITEM TRAFFIC CONTROL	76664	2330	18467			97461	.626	2A00 ITEM
28D1 1	ALL OPERATIONS	65181	6326	66321	2000	549256	689084	4.428	28D1 1
28D1	ITEM UTILITY WORK-ALTERNATE	65181	6326	66321	2000	549256	689084	4.428	28D1 ITEM
2CD0 1	GENL EXTERIOR PROTECT 15 DA	8063 537.533	2608 173.867	3396 226.400			14067 937.800	.090	2CD0 1
2CD0 2	SIDEWALK VAULTS & WALLS 350 LF	32970 94.200	6310 18.029	7798 22.280	8133 23.237		55211 157.746	.355	2CD0 2
2CD0	ITEM PROTECT ADJ STRUCTURES	41033	8918	11194	8133		69278	.445	2CD0 ITEM
2DDY 1	F.I.&R. PUMP SYSTEM					246377	246377	1.583	2DDY 1
2DDY 2	F.I.&R. RECHARGE SYST					237465	237465	1.526	2DDY 2
2DDY 3	MAINT SYST-FIRST 6 MOS 6 MO					180457 30076.167	180457 30076.167	1.160	2DDY 3

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2DDY 4 MAINT SYST-AFTER 6 MOS 12 MO					372816	372816	2.396
					31068.000	31068.000	
2DDY ITEM CONTROL GROUNDWATER					1037115	1037115	6.665
2E00 1 CENTER PILE EXPL HOLE 60 EA	5303 88.383	744 12.400	371 6.183		6418	6418	.041
2E00 2 DRILL HOLES-CENTR PILE 60 EA	20036 333.933	23728 395.467	2523 42.050		46287 771.450	46287 771.450	.297
2E00 3 PLACE&SPLICE CEN.PILES 60 EA	14599 243.317	5380 89.667	48762 812.700		68741 1145.683	68741 1145.683	.442
2E00 5 BACKFILL PILE HOLES 60 EA	5276 87.933	1324 22.067	5886 98.100		12486 208.100	12486 208.100	.080
2E00 6 PILE CAPS, WALES, DECKBM 645 TON	76234 118.192	16701 25.893	327636 508.273		420771 652.358	420771 652.358	2.704
2E00 7 LATERAL & SWAY BRACING 50 TON	25722 514.440	4617 92.340	36801 736.020		67140 1342.800	67140 1342.800	.431
2E00 8 DECK MATS & TIMBERS 5289 SY	21178 4.004	1564 .296	186597 35.280		209339 39.580	209339 39.580	1.345
2E00 9 REPOST DECK SUPPORT 60 EA	28981 483.017	8978 149.633	6529 108.817		44488 741.467	44488 741.467	.286
2E00 11 REMOVE TIMBER DECKING 5289 SY	11814 2.234	1825 .345	827 .156		14466 2.735	14466 2.735	.093

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT		TOTAL COST ANALYSIS				PROJECT SUMMARY			DOT 3-2MY
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2E00 12	REMOVE DECK BEAMS 600 TON	26526 44.210	11336 18.893	1857 3.095			39719 66.198	.255	2E00 12
2E00 13	REMOVE WALES & CAPS 157 TON	11109 70.758	4748 30.242	778 4.955			16635 105.955	.107	2E00 13
2E00 14	REM.LAG.& PILES TO -6 1400 LF	11139 7.956	3014 2.153	780 .557			14933 10.666	.096	2E00 14
2E00 ITEM	STREET DECKING 5289 SY	257917 48.765	83959 15.874	619547 117.139			961423 181.778	6.178	2E00 ITEM
2FCY 1	MOB.SLURRY PLT.EQUIP. 30 DA	17083 569.433	30490 1016.333	1196 39.867			48769 1625.633	.313	2FCY 1
2FCY 2	PRECAST YARD 60 DA	99441 1657.350	46516 775.267	6961 116.017	914800 15246.667	190680 3178.000	1258398 20973.300	8.087	2FCY 2
2FCY 3	TRENCH @ WALL LOCATION 1400 LF	30927 22.091	4340 3.100	30615 21.868			65882 47.059	.423	2FCY 3
2FCY 4	EXCV SLOT FOR PANELS 15867 CY	90313 5.692	115355 7.270	6322 .398			211990 13.360	1.362	2FCY 4
2FCY 5	SET PRE-CAST PANELS 234 EA	75974 324.675	38601 164.962	22643 96.765			137218 586.402	.882	2FCY 5
2FCY 6	OPERATE SLURRY EQUIP. 166 DA	217327 1309.199	49083 295.681	154898 933.120			421308 2538.000	2.707	2FCY 6

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT

DOT 3-2MY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
2FCY 7 DEMOBE.SLURRY EQUIP. 10 DA	992.700	281.600	69.500	76836			13438	.086	2FCY 7
2FCY 8 PLACE LAGGING 1ST.10FT 14000 SF	20219	1855	10655	76.000	26.000		32729	.210	2FCY 8
2FCY 9 CLN.PNL.& PATCH JT. 200 DA	78592	17632	14447	991636	216966		110671	.711	2FCY 9
2FCY 21 STATION END BULKHEADS 1011 SY	59649	28308	23384	83.331	18.232		214463	1.378	2FCY 21
2FCY ITEM GROUND SUPPORT WALL 11900 SY	699452	334996	271816				2514866	16.161	2FCY ITEM
2GFY 1 MOBILIZE & DEMOBILIZE 10 DA	409.800	287.800	28.700				7263	.047	2GFY 1
2GFY 2 INST. TIEBACK-LEVEL 2 38150 LF	152252	79249	121416				352917	2.268	2GFY 2
2GFY 3 INSTALL WALE-LEVEL 2 80 TON	31903	8988	22633				63524	.408	2GFY 3
2GFY 4 INST. TIEBACK-LEVEL 3 30800 LF	61462	31992	94502				187956	1.208	2GFY 4
2GFY 5 INSTALL WALE-LEVEL 3 80 TON	31903	8988	22633				63524	.408	2GFY 5
	398.788	112.350	282.913				794.050		
	398.788	112.350	282.913				794.050		

		TOTAL COST ANALYSIS				PROJECT SUMMARY			DOT 3-2MY	
TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT		LA8OR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT		
2GFY 6	INST. TIEBACK-LEVEL 4 26600 LF	53082 1.996	27630 1.039	82161 3.089			162873 6.123	1.047	2GFY 6	
2GFY 7	INSTALL WALE-LEVEL 4 120 TON	31815 265.125	8964 74.700	32827 273.558			73606 613.383	.473	2GFY 7	
2GFY 8	INST. TIEBACK-LEVEL 5 24150 LF	48189 1.995	25084 1.039	74896 3.101			148169 6.135	.952	2GFY 8	
2GFY 9	INSTALL WALE-LEVEL 5 84 TON	31943 380.274	8999 107.131	24216 288.286			65158 775.690	.419	2GFY 9	
2GFY 10	INST. TIEBACK-LEVEL 6 22050 LF	44001 1.996	22902 1.039	68726 3.117			135629 6.151	.872	2GFY 10	
2GFY 11	INSTALL WALE-LEVEL 6 84 TON	31943 380.274	8999 107.131	24216 288.286			65158 775.690	.419	2GFY 11	
2GFY 12	INST. TIEBACK-LEVEL 7 17850 LF	35620 1.996	18540 1.039	56384 3.159			110544 6.193	.710	2GFY 12	
2GFY 13	INSTALL WALE-LEVEL 7 89 TON	31865 358.034	8978 100.876	25311 284.393			66154 743.303	.425	2GFY 13	
2GFY 14	REMOVE WALE STEEL 537 TON	32172 59.911	11560 21.527	2252 4.194			45984 85.631	.296	2GFY 14	
2GFY 21	END BULKHEADS 14600 LF	58400 4.000	25112 1.720	58108 3.980			141620 9.700	.910	2GFY 21	
2GFY ITEM	BRACING - TIEBACK 174200 LF	680648 3.907	298863 1.716	710568 4.079			1690079 9.702	10.861	2GFY ITEM	

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT		TOTAL COST ANALYSIS		PROJECT SUMMARY		DOT 3-2MY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2HFQ 1	BREAK PAVEMENT & HAUL 4500 SY	10566 2.348	4397 .977	740 .164			15703 3.490	.101 2HFQ 1
2HFQ 2	EXCAVATE FIRST 5 FT 7500 CY	40477 5.397	19555 2.607	2833 .378			62865 8.382	.404 2HFQ 2
2HFQ 3	EXCAVATE 5 TO 22 FT 25600 CY	65126 2.544	48943 1.912	4559 .178			118628 4.634	.762 2HFQ 3
2HFQ 4	EXCAVATE 22 TO 70 FT 72200 CY	128056 1.774	162696 2.253	8964 .124			299716 4.151	1.926 2HFQ 4
2HFQ 5	FINE GRADE INVERT 4500 SY	19344 4.299	8872 1.972	1354 .301			29570 6.571	.190 2HFQ 5
2HFQ ITEM	EXCAVATION 105300 CY	263569 2.503	244463 2.322	18450 .175			526482 5.000	3.383 2HFQ ITEM
2ICR 1	LEVELING SLAB FORMS 14 EA	8377 598.357		3526 251.857			11903 850.214	.076 2ICR 1
2ICR 2	POUR LEVELING SLAB 496 CY	18944 38.194	1934 3.899	1326 2.673	14681 29.599		36885 74.365	.237 2ICR 2
2ICR 3	BASE SLAB REBAR 817 TON	129343 158.315	9251 11.323	9054 11.082	343140 420.000		490788 600.720	3.154 2ICR 3
2ICR 4	BASE SLAB BULKHEADS 5880 SF	35899 6.105		4834 .822			40733 6.927	.262 2ICR 4

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT

TOTAL COST ANALYSIS

PROJECT SUMMARY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2ICR 5	BASE SLAB-POUR, CLEANUP 10B92 CY	75714 6.951	7732 .710	5300 .497	32B746 30.1B2	417492 38.330	2.6B3	2ICR 5
2ICR 11	MEZZ STRUCTURAL STEEL 336 TON	22370 66.577	6525 19.420	1566 4.661	235200 700.000	265661 790.65B	1.707	2ICR 11
2ICR 12	PRESTRESS MEZZ STEEL 336 TON	10306 30.673	240 .714	721 2.146		11267 33.533	.072	2ICR 12
2ICR 13	ROOF STRUCTURAL STEEL B19 TON	B7240 106.520	2544B 31.072	6107 7.457	573300 700.000	692095 845.049	4.44B	2ICR 13
2ICR 14	PRESTRESS ROOF STEEL B19 TON	20095 24.536	468 .571	1407 1.71B		21970 26.825	.141	2ICR 14
2ICR 21	FORM COLUMN PEDESTAL 2436 SF	71B0 2.947		1617 .664		B797 3.611	.057	2ICR 21
2ICR 22	COL PEDESTAL REBAR 12 TON	300B 250.667	265 22.0B3	211 17.5B3	5040 420.000	B524 710.333	.055	2ICR 22
2ICR 23	POUR COL PED& CLEANUP 158 CY	2974 1B.B23	208 1.316	20B 1.316	4776 30.22B	8166 51.6B4	.052	2ICR 23
2ICR 33	LOWER COLUMN REBAR 11 TON	300B 273.455	265 24.091	211 19.1B2	4620 420.000	8104 736.727	.052	2ICR 33
2ICR 34	FORM LOWER COLUMNS 5046 SF	15096 2.992		3060 .606		1B156 3.598	.117	2ICR 34
2ICR 35	POUR LOWER COLUMNS 140 CY	2974 21.243	208 1.486	20B 1.486	4249 30.350	7639 54.564	.049	2ICR 35

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
2ICR 41 ASSEM MEZZ SLAB FORM 15 DA	16055 1070.333	1460 97.333	81924 5461.600			99439 6629.267	.639
2ICR 42 MOVE & SET MEZZ FORMS 700 LF	57710 82.443		5740 8.200			63450 90.643	.408
2ICR 43 MEZZ SLAB REBAR 187 TON	40749 217.909	2915 15.588	2852 15.251	78540 420.000		125056 668.749	.804
2ICR 44 POUR MEZZ SLAB 2492 CY	37856 15.191	3867 1.552	2650 1.063	75213 30.182		119586 47.988	.768
2ICR 53 UPPER COLUMN REBAR 6 TON	1505 250.833	132 22.000	105 17.500	2520 420.000		4262 710.333	.027
2ICR 54 FORM UPPER COLUMNS 2610 SF	7808 2.992		1694 .649			9502 3.641	.061
2ICR 55 POUR UPPER COLUMNS 72 CY	2974 41.306	208 2.889	208 2.889	2198 30.528		5588 77.611	.036
2ICR 61 ASSEM ROOF SLAB FORM 15 DA	16055 1070.333	1460 97.333	36924 2461.600			54439 3629.267	.350
2ICR 62 MOVE & SET ROOF FORMS 700 LF	57710 82.443		5100 7.286			62810 89.729	.404
2ICR 63 ROOF SLAB REBAR 253 TON	55121 217.870	3943 15.585	3858 15.249	106260 420.000		169182 668.704	1.087
2ICR 64 POUR ROOF SLAB 3367 CY	37940 11.268	3875 1.151	2656 .789	101671 30.196		146142 43.404	.939

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
2ICR 65	PLACE ROOF WATERPROOF 4511 SY					46238 10.250	46238 10.250	.297	2ICR 65
2ICR 66	MORTOR PROT. FOR W.P. 500 CY	1B36B 36.736	2638 5.276	1916 3.832	19373 38.746		42295 84.590	.272	2ICR 66
2ICR 71	FORM STA PLATFORM 33000 SF	B262B 2.504		29104 .882			111732 3.386	.718	2ICR 71
2ICR 72	STA.PLATFORM REBAR 120 TON	268B6 224.050		1882 15.683	50400 420.000		79168 659.733	.509	2ICR 72
2ICR 73	POUR STA PLATFORM 1610 CY	11114 6.903	238 .148	778 .483	49517 30.756		61647 38.290	.396	2ICR 73
2ICR 74	FORM STATION STAIRWAYS 2400 SF	11966 4.986		3350 1.396			15316 6.382	.098	2ICR 74
2ICR 75	STATION STAIRWAY REBAR 4 TON	2023 505.750		142 35.500	1680 420.000		3845 961.250	.025	2ICR 75
2ICR 76	POUR STATION STAIRWAYS 48 CY	4142 86.292	355 7.396	290 6.042	1465 30.521		6252 130.250	.040	2ICR 76
2ICR 78	TRACK INVERT FILL CONC 700 CY	12620 18.029	1795 2.564	1513 2.161	21536 30.766		37464 53.520	.241	2ICR 78
2ICR 81	ELECTRICAL-EMBEDDED					125000	125000	.803	2ICR 81
2ICR 82	MECHANICAL-EMBEDDED					75000	75000	.482	2ICR 82

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT	
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT					
2ICR 83	MISC METALS							37500	.241	2ICR 83
2ICR 91	PATCH&POINT-FORM SURF 148000 SF	30187 .204		2113 .014	1724 .012			34024 .230	.219	2ICR 91
2ICR 92	CLEANUP STRUCTURE 15 DA	8872 591.467	497 33.133	621 41.400				9990 666.000	.064	2ICR 92
2ICR ITEM	CONSTRUCT PERM STRUCT 19975 CY	982817 49.202	75927 3.801	224776 11.253	2025849 101.419	283738 14.205		3593107 179.880	23.090	2ICR ITEM
2JFQ 1	BACKFILL & TAMP 2 FT 3000 CY	17580 5.860	782 .261	1231 .410	12000 4.000			31593 10.531	.203	2JFQ 1
2JFQ 2	BACKFILL & TMP 2-22 FT 30100 CY	26777 .890	9241 .307	1874 .062	120400 4.000			158292 5.259	1.017	2JFQ 2
2JFQ 3	BACKFILL & TMP.TOP 5FT 7500 CY	50766 6.769	6306 .841	3554 .474	30000 4.000			90626 12.083	.582	2JFQ 3
2JFQ ITEM	BACKFILL 40600 CY	95123 2.343	16329 .402	6659 .164	162400 4.000			280511 6.909	1.803	2JFQ ITEM
2K00 1	STREET:6 IN SUBGRADE 4667 SY	4829 1.035	1330 .285	338 .072	5850 1.253			12347 2.646	.079	2K00 1
2K00 2	STREET:4 IN BASE AC 4667 SY	4829 1.035	1330 .285	338 .072	3750 .804			10247 2.196	.066	2K00 2

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT	ITEM
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT					
2K00 3	STREET PAVING 4667 SY				14817			14817	.095	2K00 3
2K00 5	BREAK-OUT REM. SIDEWALK 2130 SY	5001 2.348	2081 .977	350 .164	3.175			7432 3.489	.048	2K00 5
2K00 6	BKFL&TMP S/W VAULTS 3400 CY	23014 6.769	2858 .841	1611 .474	14000 4.118			41483 12.201	.267	2K00 6
2K00 7	SIDEWALK:4 IN. SURGRADE 2825 SY	4869 1.724	1340 .474	341 .121	1900 .673			8450 2.991	.054	2K00 7
2K00 8	SIDEWALK:POUR 4IN.CONC 2825 SY	16592 5.873		2154 .762	10126 3.584			28872 10.220	.186	2K00 8
2K00 9	ACCESS WALKWAYS 16 DA	7465 466.563	530 33.125	2441 152.563				10436 652.250	.067	2K00 9
2K00 ITEM RESTORATION		66599	9469	7573	35626		14817	134084	.862	2K00 ITEM
2N00 1	FIXED EXPENSE	100800	46000	228056				374856	2.409	2N00 1
2N00 ITEM OVERHEAD-FIXED COSTS		100800	46000	228056				374856	2.409	2N00 ITEM
20MQ 1	OVERHEAD LABOR 36 MO	1385800 38494.444		97006 2694.611				1482806 41189.056	9.529	20MQ 1
20MQ 2	OVERHEAD EXPENSES 36 MO			432000 12000.000				432000 12000.000	2.776	20MQ 2

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT		TOTAL COST ANALYSIS		PROJECT SUMMARY			DOT 3-2MY	
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
20MQ 3	GENERAL SERVICE CREW 640 DA	966402 1510.003	82138 128.341	67648 105.700			1116188 1744.044	7.173
20MQ 4	VEHICLE OPERATION 36 MO		42300 1175.000				42300 1175.000	.272
20MQ ITEM	OVERHEAD-TIME RELATED 36 MO	2352202 65338.944	124438 3456.611	596654 16573.722			3073294 85369.278	19.750
2P00 1	FIXED PLANT EXPENSES	119720	29000	117480		23800	290000	1.864
2P00 ITEM	PLANT-FIXED COSTS	119720	29000	117480		23800	290000	1.864
2QMQ 1	PLANT-TIME RELATED 36 MO		12800 355.556	216900 6025.000			229700 6380.556	1.476
2QMQ ITEM	PLANT-TIME RELATED 36 MO		12800 355.556	216900 6025.000			229700 6380.556	1.476

TRANSIT STATION-SITE 3-PRECAST WALL-TIEBACK BRACING-70 FOOT DOT 3-2MY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	5801725	1293818	3114461	3225644	2125692	15561340	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-3GY

RAPID TRANSIT LINE SECTION
SITE 1 - 70' DEPTH
SOLDIER PILE & LAGGING GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

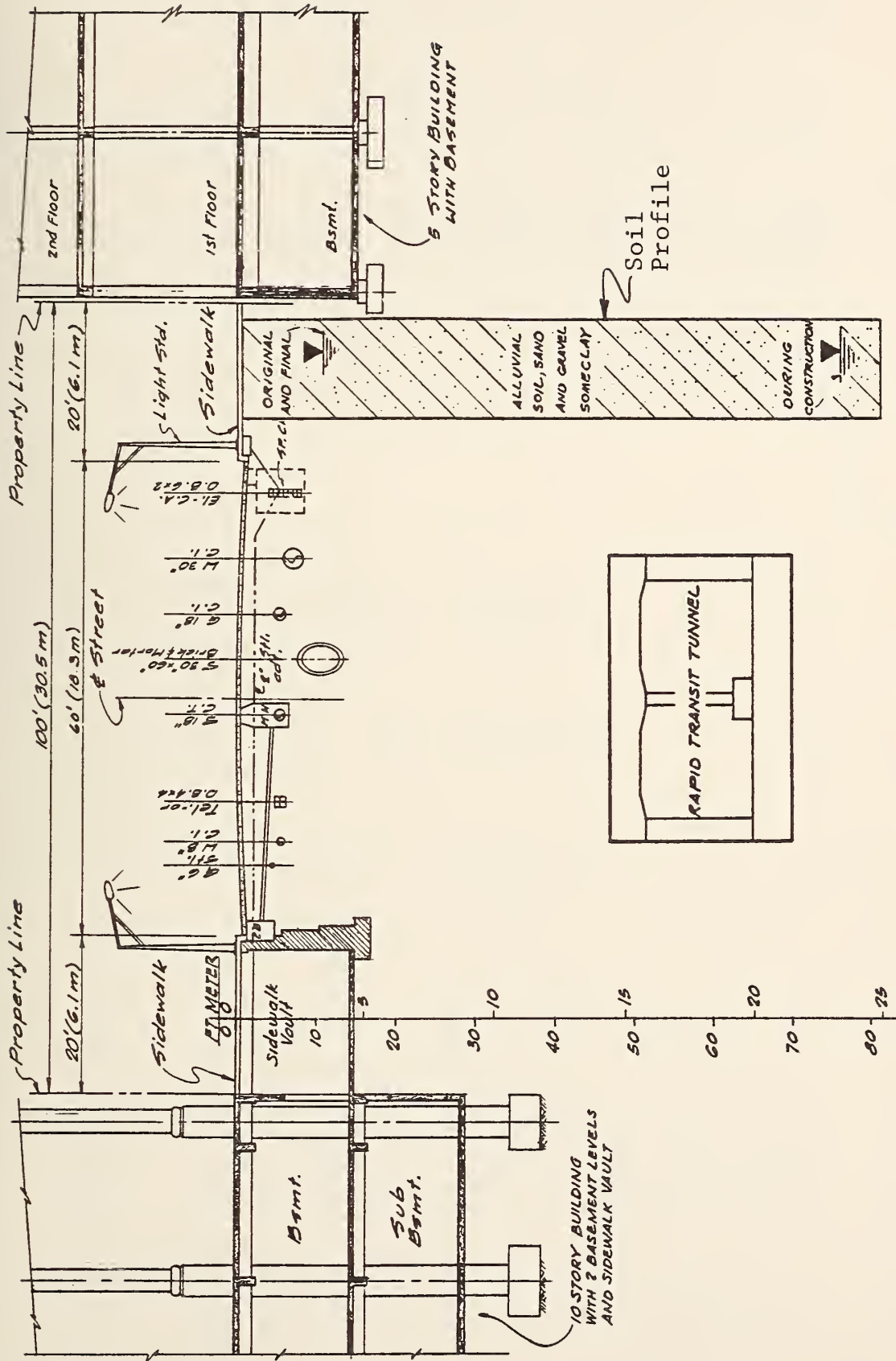


Figure 9. PROJECT 1-3GY - TRANSIT TUNNEL
 SITE 1 - 70' DEPTH
 SOLDIER PILES & LAGGING - INTERNAL BRACING

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT		DOT 1-3GY
TOTAL COST ANALYSIS		
LABOR	5400108	
EQPT	1169265	
JOB MATL	4084314	
PERM MATL	2653733	
SUB-CONT	2301035	
TOTAL	15608455	100.000
TOTAL ESTIMATE		
PROJECT		
	15608455	100.000

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3A00 1	CONST BARRICADES, ETC 40 DA	1037	25799			64393	.413
		25.925	644.975			1609.825	
3A00 2	SET & MOVE BARRIC, ETC 30 DA	1812	3514			24531	.157
		60.400	117.133			817.700	
3A00 3	FLAGMEN-DIRECT TRAFFIC 200 DA		2166			33110	.212
			10.830			165.550	
3A00 ITEM	TRAFFIC CONTROL	2849	31479			122034	.782
3BA0 21	UTILITY SUPPORT LONG. 2000 LF	11040	69713			150284	.963
		34.766	34.857			75.142	
3BA0 22	UTILITY SUPPORT INTER. 4 EA	1586	18648			42711	.274
		396.500	4662.000			10677.750	
3BA0 23	STORM DR&SEW. TEMP. LONG 4000 LF	5520	39129			89342	.572
		1.380	9.782			22.336	
3BA0 24	STORM DR&SEW. PERM. LONG 4000 LF				180000	180000	1.153
					45.000	45.000	
3BA0 26	SEWER PERM. LONGITUD. 4000 LF				49200	49200	.315
					12.300	12.300	
3BA0 28	SEW. 18IN PERM. INTER. 4 EA				3936	3936	.025
					984.000	984.000	
3BA0 30	STM. DR. LATER. PERM. LONG 8 EA				2400	2400	.015
					300.000	300.000	

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3BA0 32 STM.DR.LATER.PERM.INT. 8 EA					2400 300.000	2400 300.000	.015 3BA0 32
3BA0 33 PERM.BUILDING LATERALS 55 EA					3667 66.673	3667 66.673	.023 3BA0 33
3BA0 35 MANHOLES SEW.PERM.LONG 8 EA					9200 1150.000	9200 1150.000	.059 3BA0 35
3BA0 37 MANHOLES SEW.PERM.INT. 4 EA					4600 1150.000	4600 1150.000	.029 3BA0 37
3BA0 41 WAT.MAIN 30IN CI LONG. 2000 LF					200000 100.000	200000 100.000	1.281 3BA0 41
3BA0 42 WATER BIN LONGITUDINAL 2000 LF					70300 35.150	70300 35.150	.450 3BA0 42
3BA0 43 WATER BIN INTERSECTION 4 EA					18896 4724.000	18896 4724.000	.121 3BA0 43
3BA0 51 GAS MAIN TEMP.LONG. 2000 LF					150000 75.000	150000 75.000	.961 3BA0 51
3BA0 52 GAS MAIN.PERM.LONG. 2000 LF					90000 45.000	90000 45.000	.577 3BA0 52
3BA0 53 GAS LINE 6IN.INTERSECT 4 EA					4344 1086.000	4344 1086.000	.028 3BA0 53
3BA0 61 TELEPH.4X4 DUCT LONGIT 2000 LF					58500 29.250	58500 29.250	.375 3BA0 61

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

		TOTAL COST ANALYSIS			PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3BA0 62	TELEPH.4X4 DUCT INTER. 4 EA					46B0 1170.000	46B0 1170.000	.030	3BA0 62
3BA0 63	TELEPHONE MANHOLE LONG 4 EA					39960 9990.000	39960 9990.000	.256	3BA0 63
3BA0 64	TELEPHONE MANHOLE INT. 4 EA					39960 9990.000	39960 9990.000	.256	3BA0 64
3BA0 72	ELECT.DUCT 2X6 INTER. 4 EA			2654 663.500			2654 663.500	.017	3BA0 72
3BA0 73	ST. LT&TR.SIG.COND.INT. 4 EA				5000 1250.000		5000 1250.000	.032	3BA0 73
3BA0 B0	BLDG. LATERAL CONNECT. 55 EA				27500 500.000		27500 500.000	.176	3BA0 B0
3BA0 81	REMOVE UTILITIES SUPP. 2000 LF	16376 8.18B		1146 .573			17522 B.761	.112	3BA0 B1
3BA0 ITEM	UTILITY WORK	153077	18146	131290		964543	1267056	8.11B	3BA0 ITEM
3C00 1	GENL EXTERIOR PROTECT 40 DA	21501 537.525	6955 173.875	7550 188.750			36006 900.150	.231	3C00 1
3C00 ITEM	PROTECT ADJ STRUCTURES	21501	6955	7550			36006	.231	3C00 ITEM
3DAY 1	FURNISH,INSTALL&REMOVE					566708	566708	3.631	3DAY 1

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3DAY 2 MAINT SYST-FIRST 6 MOS 6 MO					183684 30614.000	183684 30614.000	1.177	3DAY 2
3DAY 3 MAINT SYST- AFTER 6 MO 7 MO					222957 31851.000	222957 31851.000	1.428	3DAY 3
3DAY ITEM CONTROL GROUND WATER					973349	973349	6.236	3DAY ITEM
3E00 6 PILE CAPS, WALES, DECKBM 1328 TON	117721 88.645	25790 19.420	672240 506.205			815751 614.270	5.226	3E00 6
3E00 7 LATERAL & SWAY BRACING 100 TON	51436 514.360	9233 92.330	73601 736.010			134270 1342.700	.860	3E00 7
3E00 8 DECK MATS & TIMBERS 9333 SY	37374 4.005	2760 .296	329271 35.280			369405 39.581	2.367	3E00 8
3E00 11 REMOVE TIMBER DECKING 9333 SY	20844 2.233	3220 .345	1459 .156			25523 2.735	.164	3E00 11
3E00 12 REMOVE DECK BEAMS 961 TON	29984 31.201	12814 13.334	2099 2.184			44897 46.719	.288	3E00 12
3E00 13 REMOVE WALES & CAPS 467 TON	33030 70.728	14115 30.225	2312 4.951			49457 105.904	.317	3E00 13
3E00 14 REM. LAG. & PILES TO -6 4000 LF	31831 7.958	8611 2.153	2228 .557			42670 10.668	.273	3E00 14
3E00 ITEM STREET DECKING 9333 SY	322220 34.525	76543 8.201	1083210 116.062			1481973 158.788	9.495	3E00 ITEM

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT

DOT 1-3GY

PROJECT SUMMARY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3FAQ 1 TRENCH FOR SOLD PILES 4000 LF	88368 22.092	12400 3.100	10586 2.647			111354 27.839	.713 3FAQ 1
3FAQ 2 DRILL HOLES FOR PILES 41000 LF	85569 2.087	101347 2.472	20340 .496			207256 5.055	1.328 3FAQ 2
3FAQ 3 SPLICE,PLACE,TRIM PILE 500 EA	101382 202.764	37365 74.730	469097 938.194			607844 1215.688	3.894 3FAQ 3
3FAQ 4 BACKFILL PILE HOLES 500 EA	32981 65.962	8273 16.546	48839 97.678			90093 180.186	.577 3FAQ 4
3FAQ 5 PLACE LAGGING 280000 SF	336999 1.204	30913 .110	252390 .901			620302 2.215	3.974 3FAQ 5
3FAQ ITEM GROUND SUPPORT WALL 31111 SY	645299 20.742	190298 6.117	801252 25.755			1636849 52.613	10.487 3FAQ ITEM
3GEQ 1 SET BRACING LEVEL NO 2 539 TON	57415 106.521	16748 31.072	273519 507.456			347682 645.050	2.228 3GEQ 1
3GEQ 2 PRESTRESS LEVEL NO 2 539 TON	13225 24.536	308 .571	926 1.718			14459 26.826	.093 3GEQ 2
3GEQ 3 SET BRACING LEVEL NO 3 500 TON	53260 106.520	15536 31.072	253728 507.456			322524 645.048	2.066 3GEQ 3
3GEQ 4 PRESTRESS LEVEL NO 3 500 TON	12268 24.536	286 .572	859 1.718			13413 26.826	.086 3GEQ 4

DOT 1-3GY

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3GEQ 5 SET BRACING LEVEL NO 4 514 TON	54751 106.519	15971 31.072	260833 507.457			331555 645.049	2.124 3GEQ 5
3GEQ 6 PRESTRESS LEVEL NO 4 514 TON	12611 24.535	294 .572	883 1.718			13788 26.825	.088 3GEQ 6
3GEQ 7 SET BRACING LEVEL NO 5 337 TON	47870 142.047	13964 41.436	171851 509.944			233685 693.427	1.497 3GEQ 7
3GEQ 8 PRESTRESS LEVEL NO 5 337 TON	11027 32.721	257 .763	772 2.291			12056 35.774	.077 3GEQ 8
3GEQ 11 REMOVE BRACING LEVEL 5 337 TON	17531 52.021	7363 21.849	1227 3.641			26121 77.510	.167 3GEQ 11
3GEQ 12 REMOVE BRACING LEVEL 4 514 TON	26738 52.019	11229 21.846	1872 3.642			39839 77.508	.255 3GEQ 12
3GEQ 13 REMOVE BRACING LEVEL 3 500 TON	26010 52.020	10924 21.848	1821 3.642			38755 77.510	.248 3GEQ 13
3GEQ 14 REMOVE BRACING LEVEL 2 539 TON	28039 52.020	11776 21.848	1963 3.642			41778 77.510	.268 3GEQ 14
3GEQ ITEM INTERNAL BRACING 1890 TON	360745 190.870	104656 55.374	970254 513.362			1435655 759.606	9.198 3GEQ ITEM
3HEQ 1 BREAK PAVEMENT & HAUL 8000 SY	18784 2.348	7817 .977	1315 .164			27916 3.490	.179 3HEQ 1

TOTAL COST ANALYSIS

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3HEQ 2	EXCAVATE FIRST 5 FT 13300 CY	71779 5.397	34675 2.607	5025 .378			111479 8.382	.714	3HEQ 2
3HEQ 3	EXCAVATE 5 TO 22 FT 45300 CY	115243 2.544	86606 1.912	8067 .178			209916 4.634	1.345	3HEQ 3
3HEQ 4	EXCAVATE 22 TO 30 FT 21300 CY	52406 2.460	56505 2.653	3668 .172			112579 5.285	.721	3HEQ 4
3HEQ 5	EXCAVATE 30 TO 50 FT 53400 CY	113647 2.128	144390 2.704	7955 .149			265992 4.981	1.704	3HEQ 5
3HEQ 6	EXCAVATE 50 TO 70 FT 53400 CY	126268 2.365	160423 3.004	8839 .166			295530 5.534	1.893	3HEQ 6
3HEQ 7	FINE GRADE INVERT 8000 SY	34391 4.299	15773 1.972	2407 .301			52571 6.571	.337	3HEQ 7
3HEQ ITEM	EXCAVATION 186700 CY	532518 2.852	506189 2.711	37276 .200			1075983 5.763	6.894	3HEQ ITEM
3IAR 1	LEVELING SLAB FORMS 20 EA	11966 598.300		3358 167.900			15324 766.200	.098	3IAR 1
3IAR 2	POUR LEVELING SLAB 860 CY	26134 30.388	2669 3.103	1829 2.127	25623 29.794		56255 65.413	.360	3IAR 2
3IAR 3	BASE SLAB REBAR 1070 TON	185224 173.107	13248 12.381	12966 12.118	449400 420.000		660838 617.606	4.234	3IAR 3

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS

PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3IAR 4	43079 5.983		5831 .810			48910 6.793	.313
3IAR 5	135109 10.128	13798 1.034	9458 .709	402875 30.201		561240 42.072	3.596
3IAR 6	29916 2.992		4396 .440			34312 3.431	.220
3IAR 7	24879 27.042	2541 2.762	1742 1.893	27835 30.255		56997 61.953	.365
3IAR 8	21406 1070.300	1947 97.350	75948 3797.400			99301 4965.050	.636
3IAR 9	14754 1.446		1033 .101	30360 2.976		46147 4.524	.296
3IAR 10	103869 201.687	6436 12.497	7271 14.118	216300 420.000		333876 648.303	2.139
3IAR 11	197840 98.920		19791 9.896			217631 108.816	1.394
3IAR 12	214578 258.217	13296 16.000	15020 18.075	349020 420.000		591914 712.291	3.792
3IAR 13	67561 3.766	6900 .385	4729 .264	541464 30.182		620654 34.596	3.976
3IAR 14	35693 18.027	5077 2.564	3339 1.686	60944 30.780		105053 53.057	.673

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT

DOT 1-3GY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT	
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT					
3IAR 15 ELECTRICAL EMBEDDED					150000			150000	.961	3IAR 15
3IAR 16 MECHANICAL EMBEDDED					70000			70000	.448	3IAR 16
3IAR 17 PATCH & POINT WLS & RF 160000 SF	32633 .204		2284 .014	1830 .011				36747 .230	.235	3IAR 17
3IAR 18 PLACE ROOF WATERPROOF 8000 SY					82000			82000	.525	3IAR 18
3IAR 19 MORTAR PROT.FOR W.P. 860 CY	24845 28.890	446 .519	2579 2.999	34502 40.119	10.250			62372 72.526	.400	3IAR 19
3IAR 20 CLEAN UP STRUCTURE 20 DA	11829 591.450	662 33.100	828 41.400					13319 665.950	.085	3IAR 20
3IAR ITEM CONSTRUCT PERM STRUCT 35040 CY	1181315 33.713	67020 1.913	172402 4.920	2140153 61.077	302000			3862890 110.242	24.749	3IAR ITEM
3JEQ 1 BACKFILL & TAMP 2 FT 5300 CY	31057 5.860	1380 .260	2174 .410	21200 4.000				55811 10.530	.358	3JEQ 1
3JEQ 2 BACKFILL & TAMP 2-22FT 53300 CY	120255 2.256	14937 .280	8418 .158	213600 4.008				357210 6.702	2.289	3JEQ 2
3JEQ 3 BACKFILL & TMP 22-41FT 50700 CY	98053 1.934	12180 .240	6864 .135	202800 4.000				319897 6.310	2.050	3JEQ 3
3JEQ 4 BACKFILL & TMP.TOP 5FT 13300 CY	90025 6.769	11183 .841	6302 .474	53200 4.000				160710 12.083	1.030	3JEQ 4
3JEQ ITEM BACKFILL 122600 CY	339390 2.768	39680 .324	23758 .194	490800 4.003				893628 7.289	5.725	3JEQ ITEM

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT

DOT 1-3GY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
3K00 1	PLACE 6IN SUBGRADE 11110 SY	3163 .285	B04 .072	13900 1.251			29355 2.642	.188	3K00 1
3K00 2	PLACE 4IN BASE COURSE 11110 SY	3163 .285	804 .072	8880 .799			24335 2.190	.156	3K00 2
3K00 3	STREET PAVING 13350 SY				42343 3.172		42343 3.172	.271	3K00 3
3K00 ITEM	STREET RESTORATION 13350 SY	22976 1.721	1608 .120	22780 1.706	42343 3.172		96033 7.193	.615	3K00 ITEM
3NA0 1	FIXED EXPENSES	67200	193504				290704	1.862	3NA0 1
3NA0 ITEM	OVERHEAD-FIXED COSTS	67200	193504				290704	1.862	3NA0 ITEM
30GQ 1	OVERHEAD LABOR 2B MO	858600 30684.286	60102 2146.500				918702 32810.786	5.886	30GQ 1
30GQ 2	OVERHEAD EXPENSES 2B MO		303800 10850.000				303800 10850.000	1.946	30GQ 2
30GQ 3	GENERAL SERVICE CREW 4B0 DA	724801 1510.002	61603 128.340	50736 105.700			837140 1744.042	5.363	30GQ 3
30GQ 4	VEHICLE OPERATION 2B MO		28000 1000.000				28000 1000.000	.179	30GQ 4
30GQ ITEM	OVERHEAD-TIME RELATED 2B MO	1583401 56550.036	89603 3200.107	414638 14808.500			2087642 74558.643	13.375	30GQ ITEM

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3PA0	1	82760	25000	79793		18800	206353	1.322	3PA0 1
3PA0	ITEM	82760	25000	79793		18800	206353	1.322	3PA0 ITEM
3QGG	1		6000	136300			142300	.912	3QGG 1
	28 MO		214.286	4867.857			5082.143		
3QGG	ITEM		6000	136300			142300	.912	3QGG ITEM
	28 MO		214.286	4867.857			5082.143		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-INTERNAL BRACING-70 FOOT DOT 1-3GY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	5400108	1169265	4084314	2653733	2301035	15608455	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 3-3JY

RAPID TRANSIT LINE SECTION
SITE 3 - 70' DEPTH
CAST-IN-SLURRY CONCRETE (SPTC) GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

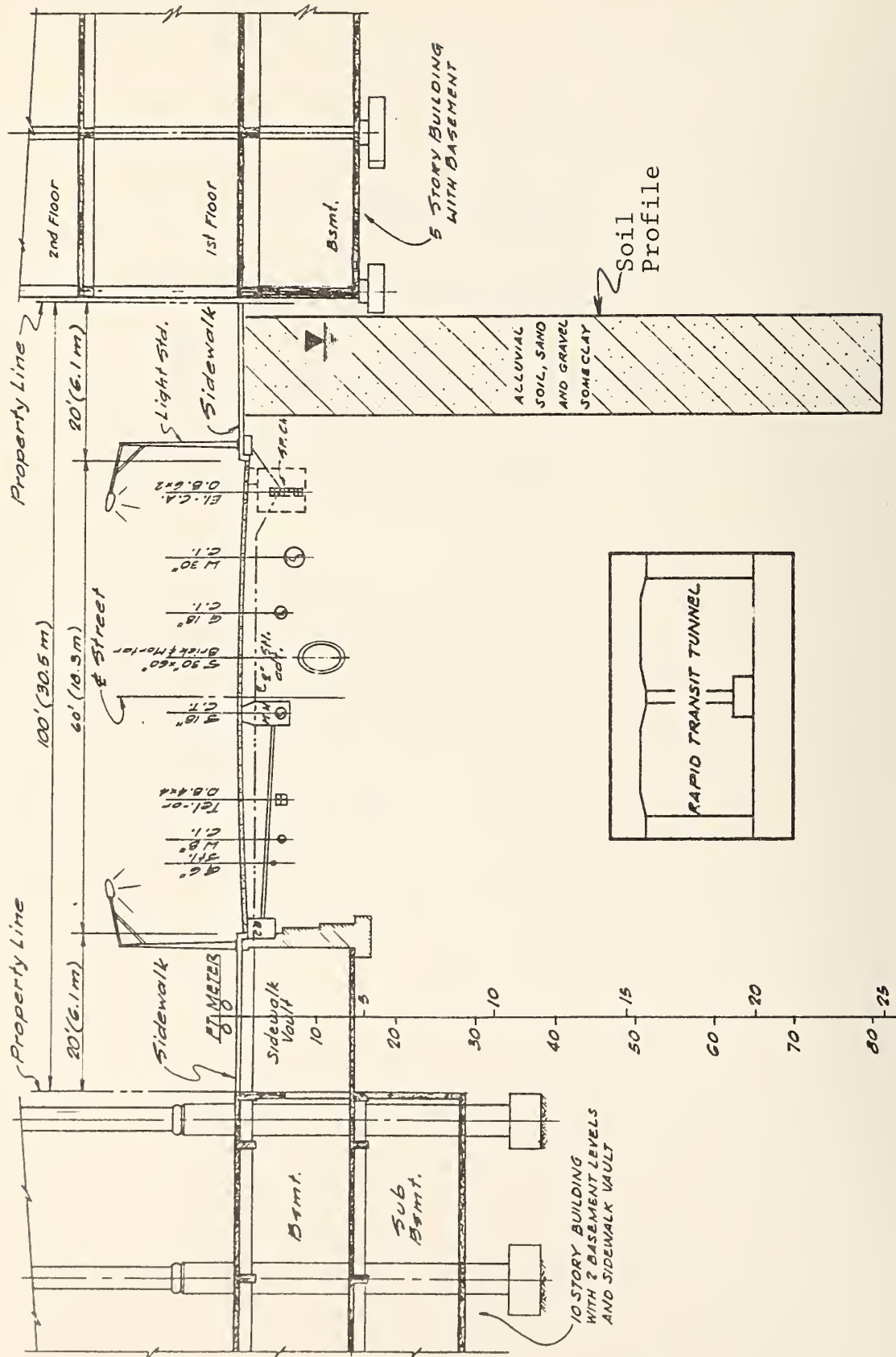


Figure 10. PROJECT 3-3JY - TRANSIT TUNNEL
 SITE 3 - 70' DEPTH
 CAST-IN-SLURRY (SPTC) - INTERNAL BRACING

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 3-3JY

TOTAL COST ANALYSIS		PROJECT SUMMARY				
LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
6009468	1636978	6197395	2140838	2824375	18809054	100.000
TOTAL ESTIMATE						
PROJECT						
						18809054
						100.000

TRANSIT TUNNEL-SITE 3-SPIC WALL-INTERNAL BRACING-70 FOOT

DOT 3-3JY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
3A00 1	CONST BARRICADES, ETC 40 DA	1037	25799			64393	.342	3A00 1	
		938.925	644.975			1609.825			
3A00 2	SET & MOVE BARRIC, ETC 30 DA	1812	3514			24531	.130	3A00 2	
		640.167	117.133			817.700			
3A00 3	FLAGMEN-DIRECT TRAFFIC 200 DA	30944	2166			33110	.176	3A00 3	
		154.720	10.830			165.550			
3A00 ITEM	TRAFFIC CONTROL	87706	31479			122034	.649	3A00 ITEM	
3BD1 1	ALL OPERATIONS	153077	131290		1465211	1767724	9.398	3BD1 1	
3BD1 ITEM	UTILITY WORK-ALTERNATE	153077	131290		1465211	1767724	9.398	3BD1 ITEM	
3C00 1	GENL EXTERIOR PROTECT 40 DA	21501	7550			36006	.191	3C00 1	
		537.525	188.750			900.150			
3C00 ITEM	PROTECT ADJ STRUCTURES	21501	7550			36006	.191	3C00 ITEM	
3DDY 1	F.I.&R. PUMP SYSTEM				297829	297829	1.583	3DDY 1	
3DDY 2	F.I.&R. RECHARGE SYST				294270	294270	1.565	3DDY 2	
3DDY 3	MAINT SYST-FIRST 6 MOS 6 MO				183219	183219	.974	3DDY 3	
					30536.500	30536.500			
3DDY 4	MAINT SYST-AFTER 6 MOS 7 MO				220703	220703	1.173	3DDY 4	
					31529.000	31529.000			
3DDY ITEM	CONTROL GROUNDWATER				996021	996021	5.295	3DDY ITEM	

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 3-3JY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3E00 6 PILE CAPS, WALES, DECKBM 1150 TON	116501 101.305	25522 22.193	583155 507.091			725178 630.590	3.855 3E00 6
3E00 7 LATERAL & SWAY BRACING 100 TON	51436 514.360	9233 92.330	73601 736.010			134270 1342.700	.714 3E00 7
3E00 8 DECK MATS & TIMBERS 8889 SY	37257 4.191	2751 .309	313723 35.293			353731 39.794	1.881 3E00 8
3E00 11 REMOVE TIMBER DECKING 8889 SY	19854 2.234	3067 .345	1390 .156			24311 2.735	.129 3E00 11
3E00 12 REMOVE DECK BEAMS 920 TON	28712 31.209	12270 13.337	2010 2.185			42992 46.730	.229 3E00 12
3E00 13 REMOVE WALES & CAPS 330 TON	23343 70.736	9975 30.227	1634 4.952			34952 105.915	.186 3E00 13
3E00 14 REM. LAG. & PILES TO -6 4000 LF	31831 7.958	8611 2.153	2228 .557			42670 10.668	.227 3E00 14
3E00 ITEM STREET DECKING 8889 SY	308934 34.755	71429 8.036	977741 109.994			1358104 152.785	7.220 3E00 ITEM
3FBY 1 MOB. SLURRY PLT. & EQUIP. 30 DA	17083 569.433	30490 1016.333	1196 39.867			48769 1625.633	.259 3FBY 1
3FBY 2 TRENCH @ WALL LOCATION 4000 LF	88368 22.092	12400 3.100	10586 2.647			111354 27.839	.592 3FBY 2

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 3-3JY

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3FBY 3	DRILL HOLES FOR PILES 36740 LF	100149 2,726	118613 3,228	7010 .191			225772 6,145	1,200	3FBY 3
3FBY 4	SPLICE, PLACE, TRIM PILE 668 EA	135449 202,768	49921 74,732	1120481 1677,367			1305851 1954,867	6,943	3FBY 4
3FBY 5	EXCAV. BETWEEN PILES 48889 CY	248648 5,086	317595 6,496	17405 .356			583648 11,938	3,103	3FBY 5
3FBY 6	OPERATE SLURRY EQUIP. 480 SH	209472 436,400	47309 98,560	130513 271,902			387294 806,863	2,059	3FBY 6
3FBY 7	PLACE TREMIE CONC. 44445 CY	240588 5,413	95471 2,148	1347791 30,325			1683850 37,886	8,952	3FBY 7
3FBY 8	DEMOB. SLURRY EQUIP. 10 DA	9927 992,700	2816 281,600	695 69,500			13438 1343,800	.071	3FBY 8
3FBY 9	PLACE LAGGING 1ST.10FT 40000 SF	57770 1,444	5299 .132	30444 .761			93513 2,338	.497	3FBY 9
3FBY 10	CLEAN&PATCH SPTC WALL 180 DA	70733 392,961	15869 88,161	5871 32,617			92473 513,739	.492	3FBY 10
3FBY ITEM	GROUND SUPPORT WALL 31111 SY	1178187 37,870	695783 22,365	2671992 85,886			4545962 146,121	24,169	3FBY ITEM
3GEQ 1	SET BRACING LEVEL NO 2 585 TON	59353 101,458	17313 29,595	296655 507,103			373321 638,156	1,985	3GEQ 1

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 3-3JY

TOTAL COST ANALYSIS PROJECT SUMMARY

		LABOR	EQPT	JOB MATL	PERM	MATL	SUB-CONT	TOTAL	PCTOT	
3GEO 2	PRESTRESS LEVEL NO 2 585 TON	13671 23.369	319 .545	957 1.636				14947 25.550	.079	3GEO 2
3GEO 3	SET BRACING LEVEL NO 3 527 TON	53473 101.467	15599 29.600	267243 507.102				336315 638.169	1.788	3GEO 3
3GEO 4	PRESTRESS LEVEL NO 3 527 TON	12317 23.372	287 .545	862 1.636				13466 25.552	.072	3GEO 4
3GEO 5	SET BRACING LEVEL NO 4 702 TON	62315 88.768	18177 25.893	355362 506.214				435854 620.875	2.317	3GEO 5
3GEO 6	PRESTRESS LEVEL NO 4 702 TON	14354 20.447	335 .477	1005 1.432				15694 22.356	.083	3GEO 6
3GEO 7	SET BRACING LEVEL NO 5 643 TON	59566 92.638	17375 27.022	325670 506.485				402611 626.145	2.141	3GEO 7
3GEO 8	PRESTRESS LEVEL NO 5 643 TON	13721 21.339	320 .498	960 1.493				15001 23.330	.080	3GEO 8
3GEO 11	REMOVE BRACING LEVEL 5 643 TON	33449 52.020	14048 21.848	2341 3.641				49838 77.509	.265	3GEO 11
3GEO 12	REMOVE BRACING LEVEL 4 702 TON	36517 52.019	15337 21.848	2556 3.641				54410 77.507	.289	3GEO 12
3GEO 13	REMOVE BRACING LEVEL 3 527 TON	27413 52.017	11514 21.848	1919 3.641				40846 77.507	.217	3GEO 13
3GEO 14	REMOVE BRACING LEVEL 2 585 TON	30431 52.019	12781 21.848	2130 3.641				45342 77.508	.241	3GEO 14
3GEO ITEM	INTERNAL BRACING 2457 TON	416580 169.548	123405 50.226	1257660 511.868				1797645 731.642	9.557	3GEO ITEM

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 3-3JY

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3HEQ 1	BREAK PAVEMENT & HAUL 7100 SY	16671 2.348	6937 .977	1167 .164			24775 3.489	.132	3HEQ 1
3HEQ 2	EXCAVATE FIRST 5 FT 11900 CY	64222 5.397	31026 2.607	4496 .378			99744 8.382	.530	3HEQ 2
3HEQ 3	EXCAVATE 5 TO 22 FT 40300 CY	102524 2.544	77046 1.912	7177 .178			186747 4.634	.993	3HEQ 3
3HEQ 4	EXCAVATE 22 TO 30 FT 19000 CY	46747 2.460	50403 2.653	3272 .172			100422 5.285	.534	3HEQ 4
3HEQ 5	EXCAVATE 30 TO 50 FT 47400 CY	100878 2.128	128165 2.704	7061 .149			236104 4.981	1.255	3HEQ 5
3HEQ 6	EXCAVATE 50 TO 70 FT 47400 CY	112094 2.365	142416 3.005	7847 .166			262357 5.535	1.395	3HEQ 6
3HEQ 7	FINE GRADE INVERT 7100 SY	30522 4.299	13998 1.972	2137 .301			46657 6.571	.248	3HEQ 7
3HEQ ITEM	EXCAVATION 166000 CY	473658 2.853	449991 2.711	33157 .200			956806 5.764	5.087	3HEQ ITEM
3IBR 1	LEVELING SLAB FORMS 20 EA	11966 598.300		3358 167.900			15324 766.200	.081	3IBR 1
3IBR 2	POUR LEVELING SLAB 780 CY	27040 34.667	2762 3.541	1893 2.427	23268 29.831		54963 70.465	.292	3IBR 2

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL		
3IBR 3	BASE SLAB REBAR 959 TON	13235 13.801	12953 13.507	402780 420.000	614007 640.258	3.264	3IBR 3	
3IBR 4	BASE SLAB BULKHEADS 6400 SF	38293 5.983	5376 .840		43669 6.823	.232	3IBR 4	
3IBR 5	BASE SLAB-POUR,CLEANUP 11860 CY	135204 11.400	13808 1.164	357929 30.180	516405 43.542	2.746	3IBR 5	
3IBR 6	FORM CENTER WALKWAY 10000 SF	29916 2.992	4396 .440		34312 3.431	.182	3IBR 6	
3IBR 7	POUR CENTER WALKWAY 920 CY	24879 27.042	1742 1.893	27B35 30.255	56997 61.953	.303	3IBR 7	
3IBR 8	ASSEM STEEL WL&RF FORM 20 DA	21406 1070.300	1947 1.947	75948 3797.400	99301 4965.050	.528	3IBR 8	
3IBR 10	WALL REBAR 215 TON	65660 305.395	4068 18.921	90300 420.000	164624 765.693	.875	3IBR 10	
3IBR 11	MOVE & SET STEEL FORMS 2000 LF	197840 98.920	19791 9.896		217631 108.816	1.157	3IBR 11	
3IBR 12	ROOF SLAB REBAR 730 TON	213808 292.888	13248 18.148	306600 420.000	548623 751.538	2.917	3IBR 12	
3IBR 13	POUR WALLS & ROOF SLAB 12600 CY	67602 5.365	6904 .548	380314 30.184	459552 36.472	2.443	3IBR 13	
3IBR 14	TRACK INVERT FILL CONC 1980 CY	35693 18.027	5077 2.564	60944 30.780	105053 53.057	.559	3IBR 14	

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 3-3JUY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT	
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT					
31BR 15 ELECTRICAL EMBEDDED					150000			150000	.797	31BR 15
31BR 16 MECHANICAL EMBEDDED					70000			70000	.372	31BR 16
31BR 17 PATCH & POINT WLS & RF 160000 SF	32633 .204		2284 .014	1830 .011				.36747 .230	.195	31BR 17
31BR 18 PLACE ROOF WATERPROOF 8000 SY					82000			82000 10.250	.436	31BR 18
31BR 19 MORTAR PROT. FOR W.P. 780 CY	25707 32.958	462 .592	2639 3.383	30258 38.792				59066 75.726	.314	31BR 19
31BR 20 CLEAN UP STRUCTURE 20 DA	11829 591.450	662 33.100	828 41.400					13319 665.950	.071	31BR 20
31BR ITEM CONSTRUCT PERM STRUCT 28140 CY	1124515 39.961	64714 2.300	168306 5.981	1682058 59.775	302000			3341593 118.749	17.766	31BR ITEM
3JUEQ 1 BACKFILL & TAMP 2 FT 4700 CY	27543 5.860	1224 .260	1928 .410	18800 4.000				49495 10.531	.263	3JUEQ 1
3JUEQ 2 BACKFILL & TAMP 2-22FT 47400 CY	106947 2.256	13285 .280	7486 .158	189600 4.000				317318 6.694	1.687	3JUEQ 2
3JUEQ 3 BACKFILL & TMP 22-41FT 45000 CY	87034 1.934	10811 .240	6092 .135	180000 4.000				283937 6.310	1.510	3JUEQ 3
3JUEQ 4 BACKFILL & TMP TOP 5FT 11900 CY	80548 6.769	10006 .841	5638 .474	47600 4.000				143792 12.083	.764	3JUEQ 4
3JUEQ ITEM BACKFILL 109000 CY	302072 2.771	35326 .324	21144 .194	436000 4.000				794542 7.289	4.224	3JUEQ ITEM

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 3-3JY

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3K00 1	PLACE 6IN SUBGRADE 11110 SY	11488 1.034	3163 .285	804 .072	13900 1.251		29355 2.642	.156	3K00 1
3K00 2	PLACE 4IN BASE COURSE 11110 SY	11488 1.034	3163 .285	804 .072	8880 .799		24335 2.190	.129	3K00 2
3K00 3	STREET PAVING 13350 SY					42343 3.172	42343 3.172	.225	3K00 3
3K00 ITEM	STREET RESTORATION 13350 SY	22976 1.721	6326 .474	1608 .120	22780 1.706	42343 3.172	96033 7.193	.511	3K00 ITEM
3N00 1	FIXED EXPENSES	67200	30000	204704			301904	1.605	3N00 1
3N00 ITEM	OVERHEAD-FIXED COSTS	67200	30000	204704			301904	1.605	3N00 ITEM
30JQ 1	OVERHEAD LABOR 31 MO	954900 30803.226		66843 2156.226			1021743 32959.452	5.432	30JQ 1
30JQ 2	OVERHEAD EXPENSES 31 MO			334850 10801.613			334850 10801.613	1.780	30JQ 2
30JQ 3	GENERAL SERVICE CREW 540 DA	815402 1510.004	69304 128.341	57078 105.700			941784 1744.044	5.007	30JQ 3
30JQ 4	VEHICLE OPERATION 31 MO		31000 1000.000				31000 1000.000	.165	30JQ 4
30JQ ITEM	OVERHEAD-TIME RELATED 31 MO	1770302 57106.516	100304 3235.613	458771 14799.065			2329377 75141.194	12.384	30JQ ITEM

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

DOT 3-3JY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3P00 1 FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	1.097
3P00 ITEM PLANT-FIXED COSTS	82760	25000	79793		18800	206353	1.097
3QJQ 1 TIME RELATED COSTS		6750	152200			158950	.845
31 MO		217.742	4909.677			5127.419	
3QJQ ITEM PLANT-TIME RELATED		6750	152200			158950	.845
31 MO		217.742	4909.677			5127.419	

DOT 3-3JY

TRANSIT TUNNEL-SITE 3-SPTC WALL-INTERNAL BRACING-70 FOOT

TOTAL COST ANALYSIS

LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
6009468	1636978	6197395	2140838	2824375	18809054	100.000
TOTAL ESTIMATE						

SUMMARY ANALYSIS
OF
ESTIMATE DOT 4-3LY

RAPID TRANSIT LINE SECTION
SITE 4 - 70' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

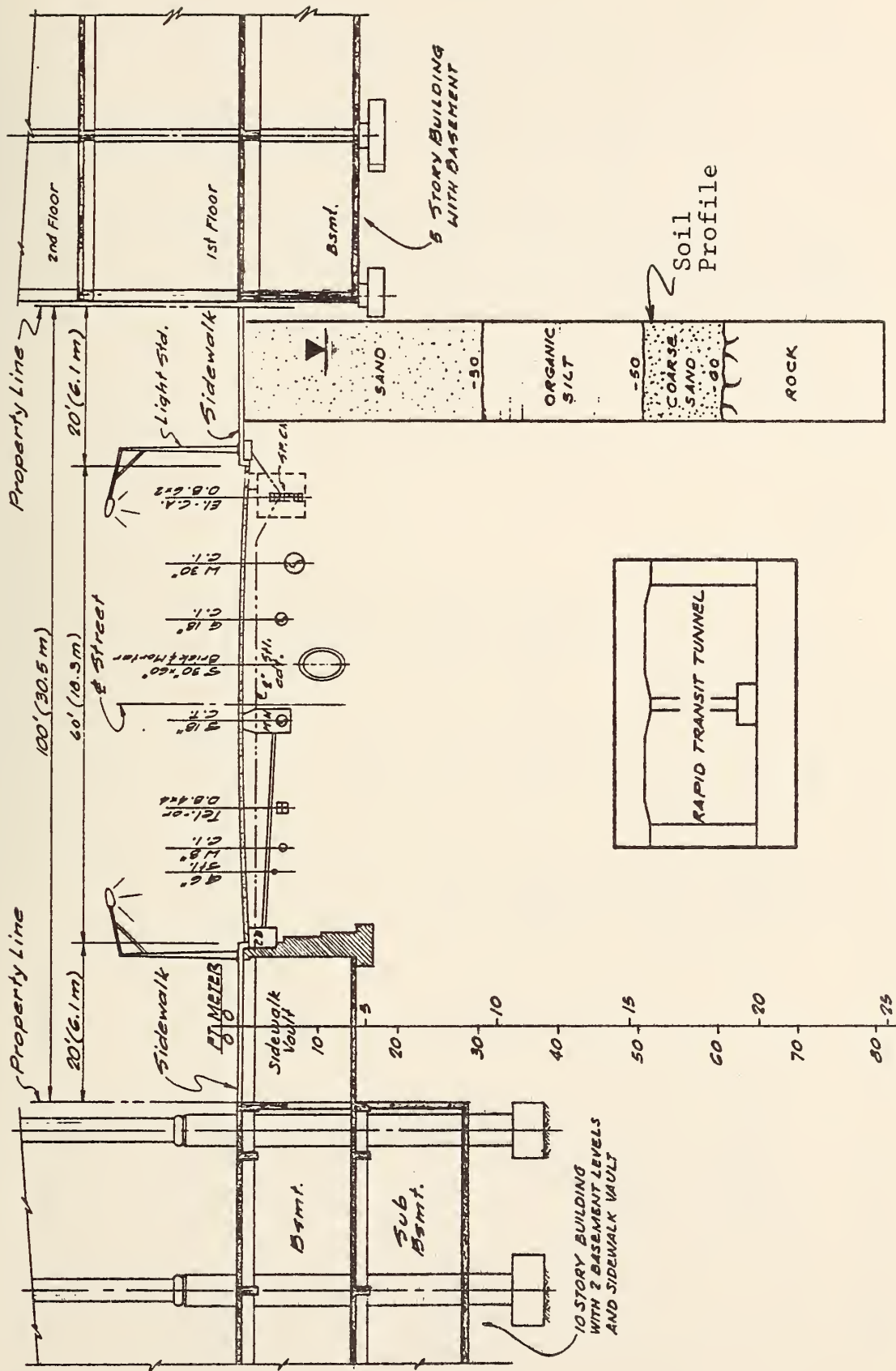


Figure 11. PROJECT 4-3LY - TRANSIT TUNNEL
 SITE 4 - 70' DEPTH
 PRECAST CONCRETE PANELS - INTERNAL BRACING

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS		PROJECT SUMMARY				
LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
7129571	1979747	4504057	4244194	2191606	20049175	100.000
TOTAL ESTIMATE						
PROJECT					20049175	100.000

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 4-3LY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3A00 1 CONST BARRICADES,ETC 40 DA	37557 938.925	1037 25.925	25799 644.975			64393 1609.825	.321 3A00 1
3A00 2 SET & MOVE BARRIC,ETC 30 DA	19205 640.167	1812 60.400	3514 117.133			24531 817.700	.122 3A00 2
3A00 3 FLAGMEN-DIRECT TRAFFIC 230 DA	35586 154.722		2491 10.830			38077 165.552	.190 3A00 3
3A00 ITEM TRAFFIC CONTROL	92348	2849	31804			127001	.633 3A00 ITEM
3BD1 1 ALL OPERATIONS	153077	18146	131290		1465211	1767724	8.817 3BD1 1
3BD1 ITEM UTILITY WORK-ALTERNATE	153077	18146	131290		1465211	1767724	8.817 3BD1 ITEM
3C00 1 GENL EXTERIOR PROTECT 40 DA	21501 537.525	6955 173.875	7550 188.750			36006 900.150	.180 3C00 1
3C00 ITEM PROTECT ADJ STRUCTURES	21501	6955	7550			36006	.180 3C00 ITEM
3DDY 1 TRENCH & SUMP-EXCAV. 140 DAY	69485 496.321	14224 101.600	15364 109.743			99073 707.664	.494 3DDY 1
3DDY 2 CONSTR INVERT SUMPS 3 EA	8130 2710.000	1259 419.667	982 327.333			10371 3457.000	.052 3DDY 2
3DDY 3 PUMPING FROM SUMPS 280 DAY	134750 481.250	30308 108.243	9433 33.689			174491 623.182	.870 3DDY 3
3DDY ITEM CONTROL GROUNDWATER	212365	45791	25779			283935	1.416 3DDY ITEM

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 4-3LY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL		
3E00 6 PILE CAPS, WALES, DECKBM 1404 TON	117138 83.432	25663 18.278	710200 505.840			853001 607.551	4.255	3E00 6
3E00 7 LATERAL & SWAY BRACING 100 TON	51436 514.360	9233 92.330	73601 736.010			134270 1342.700	.670	3E00 7
3E00 8 DECK MATS & TIMBERS 10667 SY	37086 3.477	2739 .257	375941 35.243			415766 38.977	2.074	3E00 8
3E00 11 REMOVE TIMBER DECKING 10667 SY	23825 2.234	3680 .345	1668 .156			29173 2.735	.146	3E00 11
3E00 12 REMOVE DECK BEAMS 1084 TON	33826 31.205	14455 13.335	2368 2.185			50649 46.724	.253	3E00 12
3E00 13 REMOVE WALES & CAPS 330 TON	23343 70.736	9975 30.227	1634 4.952			34952 105.915	.174	3E00 13
3E00 14 REM. LAG. & PILES TO -6 4000 LF	31831 7.958	8611 2.153	2228 .557			42670 10.668	.213	3E00 14
3E00 ITEM STREET DECKING 10667 SY	318485 29.857	74356 6.971	1167640 109.463			1560481 146.291	7.783	3E00 ITEM
3FCY 1 MOB. SLURRY PLT, EQUIP. 30 DA	17083 569.433	30490 1016.333	1196 39.867			48769 1625.633	.243	3FCY 1
3FCY 2 PRECAST YARD 140 DA	232031 1657.364	108540 775.286	16242 116.014	1607728 11483.771	358240 2558.857	2322781 16591.293	11.585	3FCY 2

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 4-3LY

PROJECT SUMMARY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3FCY 3 TRENCH @ WALL LOCATION 4000 LF	88368 22.092	12400 3.100	77997 19.499			178765 44.691	.892	3FCY 3
3FCY 4 EXCV SLOT FOR PANELS 27556 CY	153992 5.588	196692 7.138	10779 .391			361463 13.117	1.803	3FCY 4
3FCY 5 DRILL FOR PILES-ROCK 1336 EA	136057 101.839	119612 89.530	24220 18.129			279889 209.498	1.396	3FCY 5
3FCY 6 SET PRE-CAST PANELS 668 EA	216890 324.686	110194 164.961	32507 48.663			359591 538.310	1.794	3FCY 6
3FCY 7 TREMIE PANEL BASE 4000 LF	58030 14.508	14189 3.547	109062 27.266			181281 45.320	.904	3FCY 7
3FCY 8 OPERATE SLURRY EQUIP. 200 DA	261840 1309.200	59136 295.680	405279 2026.395			726255 3631.275	3.622	3FCY 8
3FCY 9 DEMOBE.SLURRY EQUIP. 10 DA	9927 992.700	2816 281.600	695 69.500			13438 1343.800	.067	3FCY 9
3FCY 10 PLACE LAGGING 1ST.10FT 40000 SF	57770 1.444	5299 .132	30444 .761			93513 2.338	.466	3FCY 10
3FCY 11 CLN.PNL.& PATCH JT. 260 DA	102169 392.958	22921 88.158	16098 61.915			141188 543.031	.704	3FCY 11
3FCY 12 GROUT WALL-ROCK SEAL 4000 LF	24818 6.205	11783 2.946	66187 16.547			102788 25.697	.513	3FCY 12
3FCY 13 ROCK FACE STABILIZED 4444 SY	105940 23.839	13145 2.958	96467 21.707			215552 48.504	1.075	3FCY 13
3FCY ITEM GROUND SUPPORT WALL 26667 SY	1464915 54.934	707217 26.520	887173 33.269	1607728 60.289	358240 13.434	5025273 188.445	25.065	3FCY ITEM

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT		TOTAL COST ANALYSIS				PROJECT SUMMARY			DOT 4-3LY
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3GEQ 1	SET BRACING LEVEL NO 2 644 TON	54878 85.214	16009 24.859	325841 505.964			396728 616.037	1.979	3GEQ 1
3GEQ 2	PRESTRESS LEVEL NO 2 644 TON	12641 19.629	295 .458	885 1.374			13821 21.461	.069	3GEQ 2
3GEQ 3	SET BRACING LEVEL NO 3 771 TON	60844 78.916	17748 23.019	389759 505.524			468351 607.459	2.336	3GEQ 3
3GEQ 4	PRESTRESS LEVEL NO 3 771 TON	14014 18.176	327 .424	981 1.272			15322 19.873	.076	3GEQ 4
3GEQ 5	DRILL & CASE EARTH-L4 21380 LF	44363 2.075	16762 .784	44796 2.095			105921 4.954	.528	3GEQ 5
3GEQ 6	DRILL ROCK & INST-L4 18700 LF	92640 4.954	50550 2.703	92099 4.925			235289 12.582	1.174	3GEQ 6
3GEQ 7	INSTALL WALES-LEVEL 4 125 TON	61315 490.520	17275 138.200	35292 282.336			113882 911.056	.568	3GEQ 7
3GEQ 11	REMOVE ANCHOR WALE 125 TON	7489 59.912	2691 21.528	524 4.192			10704 85.632	.053	3GEQ 11
3GEQ 12	REMOVE INTERN. BRACING 1415 TON	49076 34.683	20611 14.566	3435 2.428			73122 51.676	.365	3GEQ 12
3GEQ ITEM	INTERNAL BRACING 1540 TON	397260 257.961	142268 92.382	893612 580.268			1433140 930.610	7.148	3GEQ ITEM

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 4-3LY

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3HFQ 1	BREAK PAVEMENT & HAUL 8889 SY	20870 2.348	8686 .977	1461 .164			31017 3.489	.155	3HFQ 1
3HFQ 2	EXCAVATE FIRST 5 FT 14800 CY	79869 5.397	38583 2.607	5591 .378			124043 8.381	.619	3HFQ 2
3HFQ 3	SAND EXCAV 5 TO 22 FT 50400 CY	160273 3.180	120447 2.390	11219 .223			291939 5.792	1.456	3HFQ 3
3HFQ 4	SAND EXCAV 22 TO 30 FT 23700 CY	59250 2.500	72637 3.065	4148 .175			136035 5.740	.679	3HFQ 4
3HFQ 5	SILT EXCAV 30 TO 50 FT 59300 CY	169386 2.856	207662 3.502	100807 1.700			477855 8.058	2.383	3HFQ 5
3HFQ 6	SAND EXCAV 50 TO 60 FT 29600 CY	73985 2.499	90703 3.064	5179 .175			169867 5.739	.847	3HFQ 6
3HFQ 7	ROCK EXCAV 60 TO 70 FT 26700 CY	131184 4.913	127129 4.761	44598 1.670			302911 11.345	1.511	3HFQ 7
3HFQ 8	FINE GRADE INVERT 8000 SY	42988 5.374	19716 2.465	12759 1.595			75463 9.433	.376	3HFQ 8
3HFQ ITEM	EXCAVATION 204500 CY	737805 3.608	685563 3.352	185762 .908			1609130 7.869	8.026	3HFQ ITEM
3IBR 1	LEVELING SLAB FORMS 20 EA	11966 598.300		3358 167.900			15324 766.200	.076	3IBR 1

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
318R 2	POUR LEVELING SLAB 840 CY	27040 32.190	2762 3.288	1893 2.254	24930 29.679		56625 67.411	.282	318R 2
318R 3	BASE SLAB REBAR 1070 TON	185224 173.107	13248 12.381	12966 12.118	449400 420.000		660838 617.606	3.296	318R 3
318R 4	BASE SLAB BULKHEADS 7200 SF	43079 5.983		6032 .838			49111 6.821	.245	318R 4
318R 5	BASE SLAB-POUR,CLEANUP 13340 CY	135204 10.135	13808 1.035	9464 .709	402582 30.179		561058 42.058	2.798	318R 5
318R 6	FORM CENTER WALKWAY 10000 SF	29916 2.992		4396 .440			34312 3.431	.171	318R 6
318R 7	POUR CENTER WALKWAY 920 CY	24879 27.042	2541 2.762	1742 1.893	27835 30.255		56997 61.953	.284	318R 7
318R 8	ASSEM STEEL WL&RF FORM 20 DA	21406 1070.300	1947 97.350	73258 3662.900			96611 4830.550	.482	318R 8
318R 10	WALL REBAR 386 TON	82529 213.806	5114 13.249	5777 14.966	162120 420.000		255540 662.021	1.275	318R 10
318R 11	MOVE & SET STEEL FORMS 2000 LF	197840 98.920		19791 9.896			217631 108.816	1.085	318R 11
318R 12	ROOF SLAB REBAR 908 TON	213338 234.954	13219 14.558	14934 16.447	381360 420.000		622851 685.959	3.107	318R 12
318R 13	POUR WALLS & ROOF SLAB 17260 CY	135204 7.833	13808 .800	9464 .548	520954 30.183		679430 39.364	3.389	318R 13

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3IBR 14	35693 18.027	5077 2.564	3339 1.686	60944 30.780		105053 53.057	.524
3IBR 15					150000	150000	.748
3IBR 16					70000	70000	.349
3IBR 17	35898 .204	2513 .014		1830 .010		40241 .229	.201
3IBR 18					87012 10.250	87012 10.250	.434
3IBR 19	25707 27.348	462 .491	2639 2.807	36531 38.863		65339 69.510	.326
3IBR 20	11829 591.450	662 33.100	828 41.400			13319 665.950	.066
3IBR ITEM	1216752 35.432	72648 2.116	172394 5.020	2058486 60.235	307012 8.940	3837292 111.744	19.139
3JEQ 1	34574 5.860	1536 .260	2420 .410	23600 4.000		62130 10.531	.310
3JEQ 2	133792 2.256	16619 .280	9365 .158	237200 4.000		396976 6.694	1.980
3JEQ 3	108884 1.934	13525 .240	7622 .135	225200 4.000		355231 6.310	1.772

DOT 4-3LY

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT

		TOTAL COST ANALYSIS				PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3JEQ 4	BACKFILL & TMP. TOP 5FT 14800 CY	100177 6.769	12444 .841	7012 .474	59200 4.000		178833 12.083	.892	3JEQ 4
3JEQ ITEM	BACKFILL 136300 CY	377427 2.769	44124 .324	26419 .194	545200 4.000		993170 7.287	4.954	3JEQ ITEM
3K00 1	PLACE 6IN SUBGRADE 11110 SY	11488 1.034	3163 .285	804 .072	13900 1.251		29355 2.642	.146	3K00 1
3K00 2	PLACE 4IN BASE COURSE 11110 SY	11488 1.034	3163 .285	804 .072	8880 .799		24335 2.190	.121	3K00 2
3K00 3	STREET PAVING 13350 SY					42343 3.172	42343 3.172	.211	3K00 3
3K00 ITEM	STREET RESTORATION 13350 SY	22976 1.721	6326 .474	1608 .120	22780 1.706		96033 7.193	.479	3K00 ITEM
3N00 1	FIXED EXPENSES	67200	30000	218704			315904	1.576	3N00 1
3N00 ITEM	OVERHEAD-FIXED COSTS	67200	30000	218704			315904	1.576	3N00 ITEM
30LQ 1	OVERHEAD LABOR 34 MD	1058700 31138.235		74109 2179.676			1132809 33317.912	5.650	30LQ 1
30LQ 2	OVERHEAD EXPENSES 34 MD			368900 10850.000			368900 10850.000	1.840	30LQ 2

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT

DOT 4-3LY

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
30LQ 3 GENERAL SERVICE CREW 600 DA	906000 1510.000	77004 128.340	63420 105.700			1046424 1744.040	5.219 30LQ 3
30LQ 4 VEHICLE OPERATION 34 MO		34000 1000.000				34000 1000.000	.170 30LQ 4
30LQ ITEM OVERHEAD-TIME RELATED 34 MO	1964700 57785.294	111004 3264.824	506429 14894.971			2582133 75945.088	12.879 30LQ ITEM
3P00 1 FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	1.029 3P00 1
3P00 ITEM PLANT-FIXED COSTS	82760	25000	79793		18800	206353	1.029 3P00 ITEM
3QLQ 1 TIME RELATED COSTS 34 MO		7500 220.588	168100 4944.118			175600 5164.706	.876 3QLQ 1
3QLQ ITEM PLANT-TIME RELATED 34 MO		7500 220.588	168100 4944.118			175600 5164.706	.876 3QLQ ITEM

TRANSIT TUNNEL-SITE 4-PRECAST WALL-INTERNAL BRACING-70 FOOT DOT 4-3LY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	7129571	1979747	4504057	4244194	2191606	20049175	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-3HY

RAPID TRANSIT LINE SECTION
SITE 1 - 70' DEPTH
SOLDIER PILE & LAGGING GROUND SUPPORT
TIEBACK BRACING

This is one of a series of twelve estimates produced by computer extension for this study, to determine the effects of variations of site conditions and construction methods on construction costs. The unit and total costs developed in these estimates were used to expand the series to 176 situation estimates. For a graphical indication of the relationship of this estimate within the series of estimates, see Table 1.

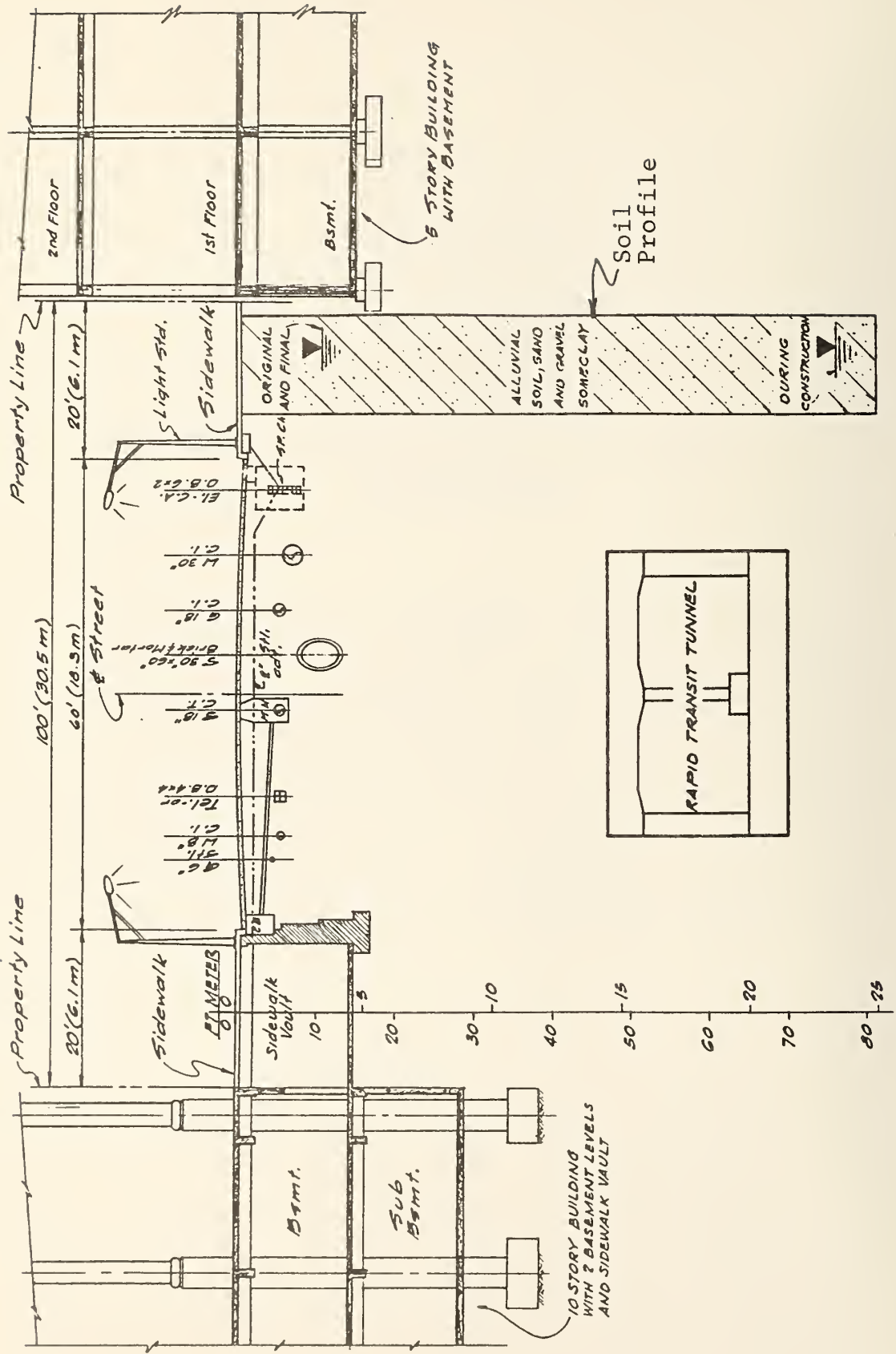


Figure 12. PROJECT 1-3HY - TRANSIT TUNNEL
 SITE 1 - 70' DEPTH
 SOLDIER PILES & LAGGING - TIEBACK BRACING

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT		DOT 1-3HY	
TOTAL COST ANALYSIS			
LABOR	EQPT	JOB MATL	PERM MATL
6107246	1524347	4372147	2653333
TOTAL ESTIMATE		2301035	2301035
		16958108	100.000
PROJECT			
		16958108	100.000

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3A00 1 CONST BARRICADES, ETC 40 DA	37557 93B.925	1037 25.925	25799 644.975			64393 1609.825	.380
3A00 2 SET & MOVE BARRIC, ETC 30 DA	19205 640.167	1812 60.400	3514 117.133			24531 817.700	.145
3A00 3 FLAGMEN-DIRECT TRAFFIC 200 DA	30944 154.720		2166 10.830			33110 165.550	.195
3A00 ITEM TRAFFIC CONTROL	87706	2849	31479			122034	.720
3BA1 1 ALL OPERATIONS	153077	18146	131290		964543	1267056	7.472
3BA1 ITEM UTILITY WORK-ALTERNATE	153077	18146	131290		964543	1267056	7.472
3C00 1 GENL EXTERIOR PROTECT 40 DA	21501 537.525	6955 173.875	7550 188.750			36006 900.150	.212
3C00 ITEM PROTECT ADJ STRUCTURES	21501	6955	7550			36006	.212
3DA7 1 ALL OPERATIONS					973349	973349	5.740
3DA7 ITEM CONTROL GRNDWTR-ALT					973349	973349	5.740
3E00 6 PILE CAPS, WALES, DECKBM 1328 TON	117721 88.645	25790 19.420	672240 506.205			815751 614.270	4.810

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3E00 7 LATERAL & SWAY BRACING 100 TON	51436 514.360	9233 92.330	73601 736.010			134270 1342.700	.792 3E00 7
3E00 8 DECK MATS & TIMBERS 9333 SY	37374 4.005	2760 .296	329271 35.280			369405 39.581	2.178 3E00 8
3E00 11 REMOVE TIMBER DECKING 9333 SY	20844 2.233	3220 .345	1459 .156			25523 2.735	.151 3E00 11
3E00 12 REMOVE DECK BEAMS 961 TON	29984 31.201	12814 13.334	2099 2.184			44897 46.719	.265 3E00 12
3E00 13 REMOVE WALES & CAPS 467 TON	33030 70.728	14115 30.225	2312 4.951			49457 105.904	.292 3E00 13
3E00 14 REM. LAG. & PILES TO -6 4000 LF	31831 7.958	8611 2.153	2228 .557			42670 10.668	.252 3E00 14
3E00 ITEM STREET DECKING 9333 SY	32220 34.525	76543 8.201	1083210 116.062			1481973 158.788	8.739 3E00 ITEM
3FAQ 1 TRENCH FOR SOLD PILES 4000 LF	88368 22.092	12400 3.100	10586 2.647			111354 27.839	.657 3FAQ 1
3FAQ 2 DRILL HOLES FOR PILES 48500 LF	101218 2.087	119878 2.472	24060 .496			245156 5.055	1.446 3FAQ 2
3FAQ 3 SPLICE, PLACE, TRIM PILE 500 EA	101382 202.764	37365 74.730	606157 1212.314			744904 1489.808	4.393 3FAQ 3

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT		TOTAL COST ANALYSIS		PROJECT SUMMARY			DOT 1-3HY	
		LABOR	EQPT	JOB MATL	PERM MATL	SU8-CONT	TOTAL	PCTOT
3FAQ 4	BACKFILL PILE HOLES 500 EA	32981 65.962	8273 16.546	81525 163.050			122779 245.558	.724 3FAQ 4
3FAQ 5	PLACE LAGGING 280000 SF	336999 1.204	30913 .110	252390 .901			620302 2.215	3.658 3FAQ 5
3FAQ ITEM	GROUND SUPPORT WALL 31111 SY	660948 21.245	208829 6.712	974718 31.330			1844495 59.288	10.877 3FAQ ITEM
3GFQ 1	MOBILIZE & DEMOBILIZE 10 DA	4098 409.800	2878 287.800	287 28.700			7263 726.300	.043 3GFQ 1
3GFQ 2	INST. TIEBACK-LEVEL 2 77000 LF	307301 3.991	159953 2.077	248271 3.224			715525 9.293	4.219 3GFQ 2
3GFQ 3	INSTALL WALE-LEVEL 2 188 TON	89530 476.223	25224 134.170	53927 286.846			168681 897.239	.995 3GFQ 3
3GFQ 4	INST. TIEBACK-LEVEL 3 64000 LF	127709 1.995	66473 1.039	199365 3.115			393547 6.149	2.321 3GFQ 4
3GFQ 5	INSTALL WALE-LEVEL 3 188 TON	89530 476.223	25224 134.170	53927 286.846			168681 897.239	.995 3GFQ 5
3GFQ 6	INST. TIEBACK-LEVEL 4 54000 LF	107755 1.995	56088 1.039	169828 3.145			333671 6.179	1.968 3GFQ 6
3GFQ 7	INSTALL WALE-LEVEL 4 229 TON	89862 392.410	25318 110.559	64370 281.092			179550 784.061	1.059 3GFQ 7

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3GFQ 8 INST. TIEBACK-LEVEL 5 36000 LF	71837 1.995	37392 1.039	116939 3.248			226168 6.282	1.334 3GFQ 8
3GFQ 9 INSTALL WALE-LEVEL 5 176 TON	86332 490.523	24323 138.199	50363 286.153			161018 914.875	.950 3GFQ 9
3GFQ 10 INST. TIEBACK-LEVEL 6 16500 LF	32925 1.995	17138 1.039	54030 3.275			104093 6.309	.614 3GFQ 10
3GFQ 11 INSTALL WALE-LEVEL 6 132 TON	51800 392.424	14594 110.561	37566 284.591			103960 787.576	.613 3GFQ 11
3GFQ 14 REMOVE WALE STEEL 913 TON	54699 59.911	19655 21.528	3829 4.194			78183 85.633	.461 3GFQ 14
3GFQ ITEM BRACING - TIEBACK 247500 LF	1113378 4.498	474260 1.916	1052702 4.253			2640340 10.668	15.570 3GFQ ITEM
3HFQ 1 BREAK PAVEMENT & HAUL 8000 SY	18784 2.348	7817 .977	1315 .164			27916 3.490	.165 3HFQ 1
3HFQ 2 EXCAVATE FIRST 5 FT 13300 CY	71779 5.397	34675 2.607	5025 .378			111479 8.382	.657 3HFQ 2
3HFQ 3 EXCAVATE 5 TO 22 FT 45300 CY	115243 2.544	86606 1.912	8067 .178			209916 4.634	1.238 3HFQ 3
3HFQ 4 EXCAVATE 22 TO 70 FT 127900 CY	226828 1.773	288184 2.253	15878 .124			530890 4.151	3.131 3HFQ 4

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

TOTAL COST ANALYSIS PROJECT SUMMARY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
3HFQ 5 FINE GRADE INVERT 8000 SY	34391 4.299	15773 1.972	2407 .301			52571 6.571	.310	3HFQ 5
3HFQ ITEM EXCAVATION 186500 CY	467025 2.504	433055 2.322	32692 .175			932772 5.001	5.500	3HFQ ITEM
3IAR 1 LEVELING SLAB FORMS 20 EA	11966 598.300		3358 167.900			15324 766.200	.090	3IAR 1
3IAR 2 POUR LEVELING SLAB 860 CY	26134 30.388	2669 3.103	1829 2.127	25623 29.794		56255 65.413	.332	3IAR 2
3IAR 3 BASE SLAB REBAR 1070 TON	185224 173.107	13248 12.381	12966 12.118	449400 420.000		660838 617.606	3.897	3IAR 3
3IAR 4 BASE SLAB BULKHEADS 7200 SF	43079 5.983		5831 .810			48910 6.793	.288	3IAR 4
3IAR 5 BASE SLAB-POUR, CLEANUP 13340 CY	135109 10.128	13798 1.034	9458 .709	402875 30.201		561240 42.072	3.310	3IAR 5
3IAR 6 FORM CENTER WALKWAY 10000 SF	29916 2.992		4396 .440			34312 3.431	.202	3IAR 6
3IAR 7 POUR CENTER WALKWAY 920 CY	24879 27.042	2541 2.762	1742 1.893	27835 30.255		56997 61.953	.336	3IAR 7
3IAR 8 ASSEM STEEL WL&RF FORM 20 DA	21406 1070.300	1947 97.350	75948 3797.400			99301 4965.050	.586	3IAR 8

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
3IAR 9 PLACE OUTER WALL W.P. 10200 SY	14754 1.446		1033 .101	30360 2.976		46147 4.524	.272	3IAR 9	
3IAR 10 WALL REBAR 515 TON	103869 201.687	6436 12.497	7271 14.118	216300 420.000		333876 648.303	1.969	3IAR 10	
3IAR 11 MOVE & SET STEEL FORMS 2000 LF	197840 98.920		19791 9.896			217631 108.816	1.283	3IAR 11	
3IAR 12 ROOF SLAB REBAR 831 TON	214578 258.217	13296 16.000	15020 18.075	349020 420.000		591914 712.291	3.490	3IAR 12	
3IAR 13 POUR WALLS & ROOF SLAB 17940 CY	67561 3.766	6900 .385	4729 .264	541464 30.182		620654 34.596	3.660	3IAR 13	
3IAR 14 TRACK INVERT FILL CONC 1980 CY	35693 18.027	5077 2.564	3339 1.686	60944 30.780		105053 53.057	.619	3IAR 14	
3IAR 15 ELECTRICAL EMBEDDED					150000	150000	.885	3IAR 15	
3IAR 16 MECHANICAL EMBEDDED					70000	70000	.413	3IAR 16	
3IAR 17 PATCH & POINT WLS & RF 160000 SF	32633 .204		2284 .014	1830 .011		36747 .230	.217	3IAR 17	
3IAR 18 PLACE ROOF WATERPROOF 8000 SY					82000 10.250	82000 10.250	.484	3IAR 18	
3IAR 19 MORTAR PROT. FOR W.P. 860 CY	24845 28.890	446 .519	2579 2.999	34502 40.119		62372 72.526	.368	3IAR 19	

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT

DOT 1-3HY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL		
3IAR 20 CLEAN UP STRUCTURE 20 DA	11829 591.450	662 33.100	828 41.400			13319 665.950	.079	3IAR 20
3IAR 31 REBRACE ABOVE ROOFLINE 406 TON	88261 217.392	25746 63.414	35178 86.645			149185 367.451	.880	3IAR 31
3IAR 32 PRESTRESS REBRACE 406 TON	20331 50.076	474 1.167	1423 3.505			22228 54.749	.131	3IAR 32
3IAR 33 REMOVE REBRACE STEEL 406 TON	21546 53.069	9049 22.288	1508 3.714			32103 79.071	.189	3IAR 33
3IAR ITEM CONSTRUCT PERM STRUCT 35040 CY	1311453 37.427	102289 2.919	210511 6.008	2140153 61.077	302000 8.619	4066406 116.050	23.979	3IAR ITEM
3JFQ 1 BACKFILL & TAMP 2 FT 5300 CY	31057 5.860	1380 .260	2174 .410	21200 4.000		55811 10.530	.329	3JFQ 1
3JFQ 2 BACKFILL & TMP 2-34 FT 104000 CY	92519 .890	31929 .307	6476 .062	416000 4.000		546924 5.259	3.225	3JFQ 2
3JFQ 3 BACKFILL & TMP. TOP 5FT 13300 CY	90025 6.769	11183 .841	6302 .474	53200 4.000		160710 12.083	.948	3JFQ 3
3JFQ ITEM BACKFILL 122600 CY	213601 1.742	44492 .363	14952 .122	490400 4.000		763445 6.227	4.502	3JFQ ITEM
3K00 1 PLACE 6IN SUBGRADE 11110 SY	11488 1.034	3163 .285	804 .072	13900 1.251		29355 2.642	.173	3K00 1

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
3K00 2	PLACE 4IN BASE COURSE 11110 SY	11488 1.034	3163 .285	804 .072	8880 .799		24335 2.190	.144
3K00 3	STREET PAVING 13350 SY					42343 3.172	42343 3.172	.250
3K00 ITEM	STREET RESTORATION 13350 SY	22976 1.721	6326 .474	1608 .120	22780 1.706	42343 3.172	96033 7.193	.566
3N00 1	FIXED EXPENSES	67200	30000	200704			297904	1.757
3N00 ITEM	OVERHEAD-FIXED COSTS	67200	30000	200704			297904	1.757
30HQ 1	OVERHEAD LABOR 28 MO	858600 30664.286		60102 2146.500			918702 32810.786	5.417
30HQ 2	OVERHEAD EXPENSES 28 MO			303800 10850.000			303800 10850.000	1.791
30HQ 3	GENERAL SERVICE CREW 480 DA	724801 1510.002	61603 128.340	50736 105.700			837140 1744.042	4.937
30HQ 4	VEHICLE OPERATION 28 MO		28000 1000.000				28000 1000.000	.165
30HQ ITEM	OVERHEAD-TIME RELATED 28 MO	1583401 56550.036	89603 3200.107	414638 14808.500			2087642 74558.643	12.311

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
3P00 1	82760	25000	79793		18800		206353	1.217	3P00 1
3P00 ITEM	82760	25000	79793		18800		206353	1.217	3P00 ITEM
3QH0 1		6000	136300				142300	.839	3QH0 1
28 MO		214.286	4867.857				5082.143		
3QH0 ITEM		6000	136300				142300	.839	3QH0 ITEM
28 MO		214.286	4867.857				5082.143		

TRANSIT TUNNEL-SITE 1-SOLDIER PILES-TIEBACK BRACING-70 FOOT DOT 1-3HY

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6107246	1524347	4372147	2653333	2301035	16958108	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-1LT

CUT-AND-COVER METHOD
FOUR LANE HIGHWAY TUNNEL
SITE 1 - 30' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of three estimates produced by computer extension for this study, to test the methods and results of the series of 176 estimates forming the basis of the study effort. Based on this series of estimates, a highway tunnel, at minimum depth, with precast concrete panel walls was chosen to test innovative basic construction methods. Traditional cut-and-cover construction (1-1LT), inverted construction (1-4LT) and combination (or partially inverted) construction (1-7LT) are compared under the same site and structure conditions. The relation of estimate 1-1LT in the series of 176 estimates is shown graphically in Table 1.

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS		PROJECT SUMMARY				
LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
6457740	1234673	3871507	3492526	2927691	17984137	100.000
TOTAL ESTIMATE						
PROJECT						
					17984137	100.000

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1A00 1	42253	1166	37713			81132	.451
45 DA	938.956	25.911	838.067			1802.933	
1A00 2	28807	2718	5271			36796	.205
45 DA	640.156	60.400	117.133			817.689	
1A00 3	37133		2599			39732	.221
240 DA	154.721		10.829			165.550	
1A00 ITEM	108193	3884	45583			157660	.877
1B00 21	89387	11040	88139			188566	1.049
2000 LF	44.694	5.520	44.070			94.283	
1B00 22	41209	2120	32429			75758	.421
4 EA	10302.250	530.000	8107.250			18939.500	
1B00 23	44693	5520	39129			89342	.497
4000 LF	11.173	1.380	9.782			22.336	
1B00 24					180000	180000	1.001
					45.000	45.000	
1B00 26					49200	49200	.274
4000 LF					12.300	12.300	
1B00 28					7380	7380	.041
4 EA					1845.000	1845.000	
1B00 30					2400	2400	.013
8 EA					300.000	300.000	

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
18D0 32 STM.DR.LATER.PERM.INT. 8 EA					2400 300.000	2400 300.000	.013 18D0 32
18D0 33 BLDG.SEW.LATERALS PERM 55 EA					3667 66.673	3667 66.673	.020 18D0 33
18D0 35 MANHOLES SEW.PERM.LONG 8 EA					9200 1150.000	9200 1150.000	.051 18D0 35
18D0 37 MANHOLES SEW.PERM.INT. 4 EA					4600 1150.000	4600 1150.000	.026 18D0 37
18D0 38 CATCH BASINS LONGIT. 8 EA					7600 950.000	7600 950.000	.042 18D0 38
18D0 39 CATCH BASINS INTER. 8 EA					7600 950.000	7600 950.000	.042 18D0 39
18D0 40 DIVERT 18IN SEWER INT. 4 EA					55904 13976.000	55904 13976.000	.311 18D0 40
18D0 41 WAT.MAIN 30IN CI LONG. 2000 LF					200000 100.000	200000 100.000	1.112 18D0 41
18D0 42 WATER 8IN LONGITUDINAL 2000 LF					70300 35.150	70300 35.150	.391 18D0 42
18D0 43 WATER 8IN INTERSECTION 4 EA					23817 5954.250	23817 5954.250	.132 18D0 43
18D0 44 RELOCATE FIRE HYD.LCNG 4 EA					10000 2500.000	10000 2500.000	.056 18D0 44

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1BD0 45 RELOCATE FIRE HYD.INT. 8 EA					20000 2500.000	20000 2500.000	.111 1BD0 45
1BD0 46 DIVERT 8IN WATER INTER 4 EA					6212 1553.000	6212 1553.000	.035 1BD0 46
1BD0 51 GAS MAIN TEMP.LONG. 2000 LF					150000 75.000	150000 75.000	.834 1BD0 51
1BD0 52 GAS MAIN,PERM.LONG. 2000 LF					90000 45.000	90000 45.000	.500 1BD0 52
1BD0 53 GAS LINE 6IN.INTERSECT 4 EA					8145 2036.250	8145 2036.250	.045 1BD0 53
1BD0 54 GAS LINE 6IN TEMP.LONG 2000 LF					114300 57.150	114300 57.150	.636 1BD0 54
1BD0 55 GAS LINE 6IN LONGITUD. 2000 LF					54300 27.150	54300 27.150	.302 1BD0 55
1BD0 56 DIVERT 6IN GAS INTER. 4 EA					26840 6710.000	26840 6710.000	.149 1BD0 56
1BD0 61 TELEPH.4X4 DUCT LONGIT 2000 LF					58500 29.250	58500 29.250	.325 1BD0 61
1BD0 62 TELEPH.4X4 DUCT INTER. 4 EA					8775 2193.750	8775 2193.750	.049 1BD0 62
1BD0 63 TELEPHONE MANHOLE LONG 4 EA					39960 9990.000	39960 9990.000	.222 1BD0 63

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
18D0 64 TELEPHONE MANHOLE INT. 4 EA					39960 9990.000	39960 9990.000	.222 18D0 64
18D0 65 DIVERT TEL.DUCT INTER. 4 EA					171212 42803.000	171212 42803.000	.952 18D0 65
18D0 71 ELECT DUCT BK.2X6 LONG 2000 LF			33175 16.588			33175 16.588	.184 18D0 71
18D0 72 ELECT.DUCT 2X6 INTER. 4 EA			4977 1244.250			4977 1244.250	.028 18D0 72
18D0 73 ST.LT&TR.SIG.COND.INT. 4 EA				19000 4750.000		19000 4750.000	.106 18D0 73
18D0 74 STREET LIGHT TEMP.LONG 24 EA	1596 66.500		112 4.667			1708 71.167	.009 18D0 74
18D0 75 STREET LIGHT PERM.LONG 24 EA	1596 66.500		112 4.667		5040 210.000	6748 281.167	.038 18D0 75
18D0 76 TR.SIG.CONTRL.TEMP INT 4 EA				8000 2000.000		8000 2000.000	.044 18D0 76
18D0 77 TR.SIG.CONTRL.PERM INT 4 EA					600 150.000	600 150.000	.003 18D0 77
18D0 78 PED.&TRAFFIC SIG.PERM. 4 EA					4800 1200.000	4800 1200.000	.027 18D0 78
18D0 79 DIVERT ELECT DUCT INT. 4 EA					103000 25750.000	103000 25750.000	.573 18D0 79

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1BD0 B0	DIVERT BLDG.LATER LONG 55 EA					165000 3000.000	165000 3000.000	.917
1BD0 81	REMOVE UTILITIES SUPP. 2000 LF	19670 9.B35		1377 .689			21047 10.524	.117
1BD0 ITEM	UTILITY WORK	198151	18680	199450	B000	1719712	2143993	11.922
1CD0 1	GENL EXTERIOR PROTECT 40 DA	21501 537.525	6955 173.875	7550 188.750			36006 900.150	.200
1CD0 2	SIDEWALK VAULTS &WALLS 1000 LF	94179 94.179	18024 18.024	21703 21.703	22979 22.979		156885 156.885	.872
1CD0 ITEM	PROTECT ADJ STRUCTURES	115680	24979	29253	22979		192891	1.073
1DDT 1	FURNISH,INSTALL&REMOVE					260634	260634	1.449
1DDT 2	MAINT SYST-FIRST 6 MOS 6 MO					149632 24938.667	149632 24938.667	.832
1DDT 3	MAINT SYST-AFTER 6 MOS 5 MO					128810 25762.000	128810 25762.000	.716
1DDT ITEM	CONTROL GROUND WATER					539076	539076	2.998
1E00 1	CENTER PILE EXPL HOLE 168 EA	14847 88.375	2083 12.399	4339 25.827			21269 126.601	.118

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LA80R	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1E00 2 DRILL HOLES-CENTR PILE 168 EA	37399 222.613	44294 263.655	2618 15.583			84311 501.851	.469
1E00 3 OPERATE SLURRY EQUIP 56 SH	24439 436.411	5520 98.571	4774 85.250			34733 620.232	.193
1E00 4 SPLICE,PLACE,TRIM,PILE 168 EA	34065 202.768	12555 74.732	82025 488.244			128645 765.744	.715
1E00 5 BACKFILL PILE HOLES 168 EA	14776 87.952	3706 22.060	14653 87.220			33135 197.232	.184
1E00 6 PILE CAPS,WALES,DECKBM 1865 TON	237227 127.199	51971 27.866	949106 508.904			1238304 663.970	6.886
1E00 7 LATERAL & SWAY BRACING 150 TON	77158 514.387	13850 92.333	110401 736.007			201409 1342.727	1.120
1E00 8 DECK MATS & TIMBERS 15333 SY	74747 4.875	5520 .360	541887 35.341			622154 40.576	3.459
1E00 9 REPOST DECK SUPPORT 168 EA	81144 483.000	25140 149.643	18280 108.810			124564 741.452	.693
1E00 11 REMOVE TIMBER DECKING 15333 SY	34974 2.281	5403 .352	2448 .160			42825 2.793	.238
1E00 12 RMV.DECK BMS.&INT.PILE 1859 TON	82189 44.211	35123 18.893	5753 3.095			123065 66.200	.684
1E00 13 REMOVE WALES & CAPS 450 TON	31832 70.738	13603 30.229	2228 4.951			47663 105.918	.265

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

		TOTAL COST ANALYSIS				PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT		
1E00 14	REM.LAG.&PILES TO -6 4000 LF	31831 7.958	8611 2.153	2228 .557			42670 10.668	.237	1E00 14	
1E00 ITEM	STREET DECKING 15333 SY	776628 50.651	227379 14.829	1740740 113.529			2744747 179.009	15.262	1E00 ITEM	
1FCT 1	MOB.SLURRY PLT,EQUIP. 30 DA	17083 569.433	30490 1016.333	1196 39.867			48769 1625.633	.271	1FCT 1	
1FCT 2	PRECAST YARD 45 DA	74580 1657.333	34887 775.267	5221 116.022	732552 16278.933	129260 2872.444	976500 21700.000	5.430	1FCT 2	
1FCT 3	TRENCH @ WALL LOCATION 4000 LF	88368 22.092	12400 3.100	77997 19.499			178765 44.691	.994	1FCT 3	
1FCT 4	EXCV SLOT FOR PANELS 11852 CY	71055 5.995	90758 7.658	4974 .420			166787 14.072	.927	1FCT 4	
1FCT 5	SET PRE-CAST PANELS 334 EA	108439 324.668	55095 164.955	24916 74.599			188450 564.222	1.048	1FCT 5	
1FCT 6	OPERATE SLURRY EQUIP. 140 DA	183288 1309.200	41395 295.679	227140 1622.429			451823 3227.307	2.512	1FCT 6	
1FCT 7	DEMOBE.SLURRY EQUIP. 10 DA	9927 992.700	2816 281.600	695 69.500			13438 1343.800	.075	1FCT 7	
1FCT 8	PLACE LAGGING 1ST.10FT 40000 SF	57770 1.444	5299 .132	30444 .761			93513 2.338	.520	1FCT 8	

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1FCT 9	CLN.PNL.& PATCH JT. 140 DA	55015 392.964	12343 88.164	12797 91.407			80155 572.536	.446 1FCT 9
1FCT ITEM	GROUND SUPPORT WALL 13333 SY	66525 49.916	285483 21.412	385380 28.904	732552 54.943	129260 9.695	2198200 164.869	12.223 1FCT ITEM
1GEN 1	SET BRACING LEVEL NO 2 524 TON	98787 188.525	28816 54.992	268915 513.197			396518 756.714	2.205 1GEN 1
1GEN 2	PRESTRESS LEVEL NO 2 524 TON	22754 43.424	530 1.011	1593 3.040			24877 47.475	.138 1GEN 2
1GEN 14	REMOVE BRACING LEVEL 2 524 TON	38662 73.782	16237 30.987	2706 5.164			57605 109.933	.320 1GEN 14
1GEN ITEM	INTERNAL BRACING 524 TON	160203 305.731	45583 86.990	273214 521.401			479000 914.122	2.663 1GEN ITEM
1HEN 1	BREAK PAVEMENT & HAUL 14000 SY	32871 2.348	13680 .977	2301 .164			48852 3.489	.272 1HEN 1
1HEN 2	EXCAVATE FIRST 5 FT 23300 CY	125744 5.397	60745 2.607	8802 .378			195291 8.382	1.086 1HEN 2
1HEN 3	EXCAVATE 5 TO 22 FT 79300 CY	201739 2.544	151609 1.912	14122 .178			367470 4.634	2.043 1HEN 3
1HEN 4	EXCAVATE 22 TO 30 FT 37300 CY	91770 2.460	98949 2.653	6424 .172			197143 5.285	1.096 1HEN 4

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1HEN 7	FINE GRADE INVERT 14000 SY	60183 4.299	27603 1.972	4213 .301			91999 6.571	.512
1HEN ITEM	EXCAVATION 139900 CY	512307 3.662	352586 2.520	35862 .256			900755 6.439	5.009
1ICR 1	LEVELING SLAB FORMS 20 EA	11966 598.300		3988 199.400			15954 797.700	.089
1ICR 2	POUR LEVELING SLAB 1540 CY	27040 17.558	2762 1.794	1893 1.229	45982 29.858		77677 50.440	.432
1ICR 3	BASE SLAB REBAR, 1926 TON	331847 172.299	23735 12.323	23229 12.061	808920 420.000		1187731 616.683	6.604
1ICR 4	BASE SLAB 8LKHDS&WK.FM 18680 SF	111766 5.983		12599 .674			124365 6.658	.692
1ICR 5	BASE SLAB-POUR,CLEANUP 25680 CY	135204 5.265	13808 .538	9464 .369	782310 30.464		940786 36.635	5.231
1ICR 9	ASSEM.STL.WL&RF&PL FRM 15 DA	16055 1070.333	1460 97.333	137124 9141.600			154639 10309.267	.860
1ICR 11	WALL REBAR 128 TON	39106 305.516	2423 18.930	2737 21.383	53760 420.000		98026 765.828	.545
1ICR 12	MOVE & SET STEEL FORMS 2000 LF	423539 211.770		42198 21.099			465737 232.869	2.590

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT 8R-30 FOOT DOT 1-1LT

	TOTAL COST ANALYSIS				PROJECT SUMMARY		TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT			
1ICR 13	ROOF SLAB REBAR 721 TON	171282 237.562	10613 14.720	11990 16.630	302820 420.000		496705 688.911	2.762 1ICR 13
1ICR 14	POUR WALLS & ROOF SLAB 11320 CY	135204 11.944	13808 1.220	9464 .836	345740 30.542		504216 44.542	2.804 1ICR 14
1ICR 15	PLACE ROOF WATERPROOF 14000 SY					143500 10.250	143500 10.250	.798 1ICR 15
1ICR 16	MORTAR PROT. FOR W.P. 1540 CY	25707 16.693	3691 2.397	3479 2.259	59667 38.745		92544 60.094	.515 1ICR 16
1ICR 17	FORM PLENUM DECK 2000 LF	81576 40.788		8380 4.190			89956 44.978	.500 1ICR 17
1ICR 18	PLEN.DECK REBAR 240 TON	60160 250.667	2650 11.042	4211 17.546	76800 320.000		143821 599.254	.800 1ICR 18
1ICR 19	POUR PLENUM DECK 3000 CY	55226 18.409	9466 3.155	3866 1.289	99674 33.225		168232 56.077	.935 1ICR 19
1ICR 20	CONST.PLENUM DIV. WALL 200 CY	20218 101.090	1261 6.305	2105 10.525	12250 61.250		35834 179.170	.199 1ICR 20
1ICR 21	ELECTRICAL EMBEDDED					230000	230000	1.279 1ICR 21
1ICR 22	MECHANICAL EMBEDDED					105000	105000	.584 1ICR 22
1ICR 23	PATCH&POINT CONC.WORK 339000 SF	69143 .204		4840 .014	3985 .012		77968 .230	.434 1ICR 23

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

		TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
1ICR 24	CLEAN UP STRUCTURE 20 DA	11829 591.450	662 33.100	828 41.400				13319 665.950	.074	1ICR 24
1ICR ITEM	CONSTRUCT PERM.STRUCT. 41740 CY	1726868 41.372	86339 2.068	282395 6.766	2591908 62.097	478500 11.464		5166010 123.766	28.725	1ICR ITEM
1JEN 4	BACKFILL & TMP.TOP 5FT 9300 CY	62950 6.769	7819 .841	4407 .474	37200 4.000			112376 12.083	.625	1JEN 4
1JEN ITEM	BACKFILL 9300 CY	62950 6.769	7819 .841	4407 .474	37200 4.000			112376 12.083	.625	1JEN ITEM
1K00 1	PLACE 6IN SUBGRADE 13350 SY	13803 1.034	3800 .285	966 .072	16700 1.251			35269 2.642	.196	1K00 1
1K00 2	PLACE 4IN BASE COURSE 13350 SY	13803 1.034	3800 .285	966 .072	10680 .800			29249 2.191	.163	1K00 2
1K00 3	STREET PAVING 13350 SY						42343 3.172		.235	1K00 3
1K00 5	BREAKOUT REM. SIDEWALK 5870 SY	13783 2.348	5736 .977	965 .164			20484 3.490		.114	1K00 5
1K00 6	BF&TMP.SIDEWALK VAULTS 9852 CY	66686 6.769	8283 .841	4668 .474	40000 4.060			119637 12.143	.665	1K00 6
1K00 7	PLACE 4IN SIDEWK.SUBGR 7785 SY	13416 1.723	3693 .474	939 .121	5200 .668			23248 2.986	.129	1K00 7

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
1K00 B PLACE 4IN CONC.SIDEWLK 7785 SY	45719 5.873		4340 .557	27307 3.508		77366 9.938		.430	1K00 8
1K00 9 ACCESS WALKWAY 40 DA	18663 466.575	1325 33.125	5554 138.850			25542 638.550		.142	1K00 9
1K00 ITEM STREET RESTORATION 13350 SY	185873 13.923	26637 1.995	18398 1.378	99887 7.482	42343 3.172	373138 27.950		2.075	1K00 ITEM
1N00 1 FIXED EXPENSE	67200	30000	166204			263404		1.465	1N00 1
1N00 ITEM OVERHEAD-FIXED COSTS	67200	30000	166204			263404		1.465	1N00 ITEM
10LN 1 OVERHEAD LABOR 31 MO	980000 31612.903		68600 2212.903			1048600 33825.806		5.831	10LN 1
10LN 2 OVERHEAD EXPENSES 31 MO			325550 10501.613			325550 10501.613		1.810	10LN 2
10LN 3 GENERAL SERVICE CREW 540 DA	815402 1510.004	69304 128.341	57078 105.700			941784 1744.044		5.237	10LN 3
10LN 4 VEHICLE OPERATION 31 MO		31000 1000.000				31000 1000.000		.172	10LN 4
10LN ITEM OVERHEAD-TIME RELATED 31 MO	1795402 57916.194	100304 3235.613	451228 14555.742			2346934 75707.548		13.050	10LN ITEM

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

		TOTAL COST ANALYSIS			PROJECT SUMMARY			
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
1P00 1	FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	1.147 1P00 1
1P00 ITEM	PLANT-FIXED COSTS	82760	25000	79793		18800	206353	1.147 1P00 ITEM
1QLN 1	TIME RELATED COSTS			159600			159600	.887 1QLN 1
	31 MO			5148.387			5148.387	
1QLN ITEM	PLANT-TIME RELATED			159600			159600	.887 1QLN ITEM
	31 MO			5148.387			5148.387	

CUT-AND-COVER CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-1LT

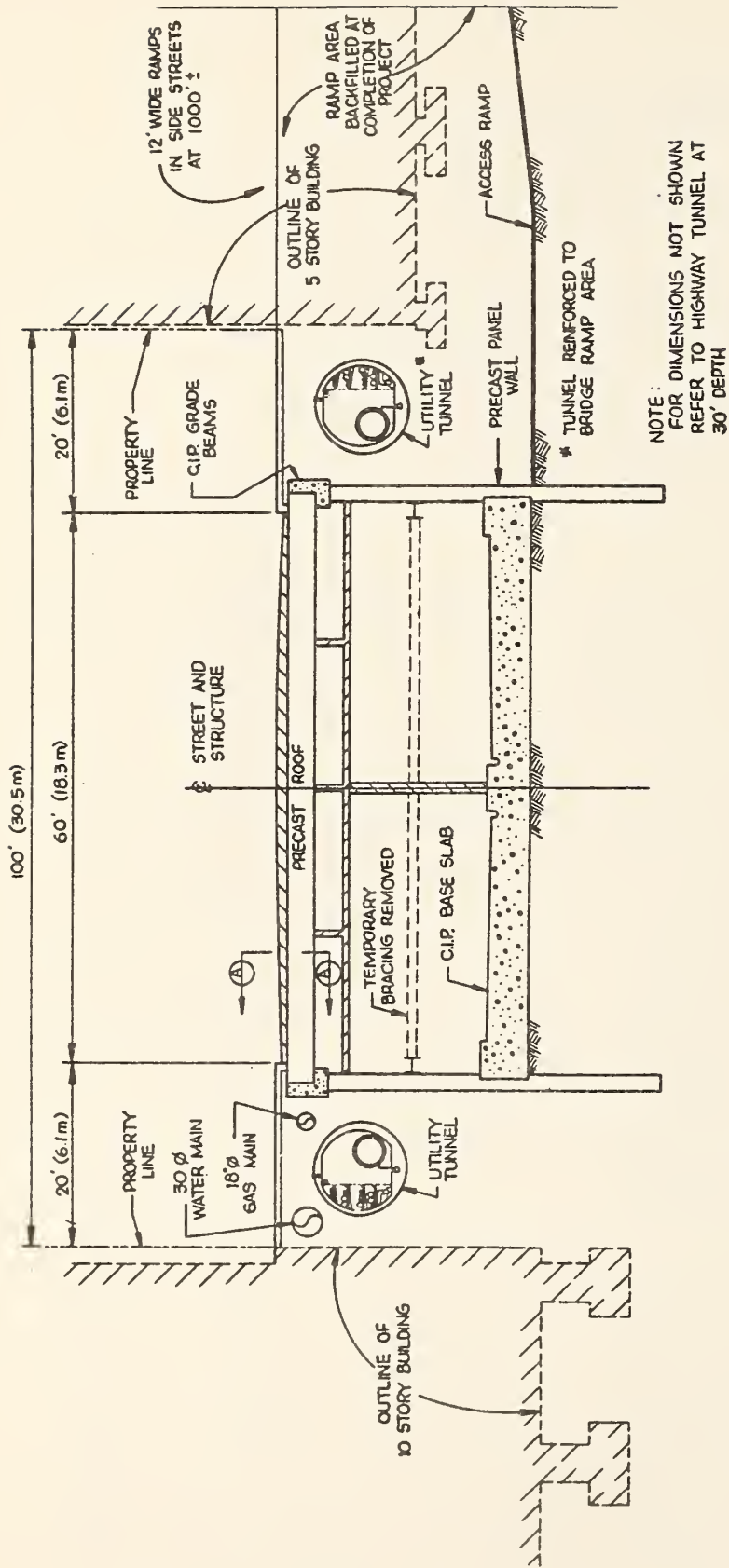
TOTAL COST ANALYSIS

LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
6457740	1234673	3871507	3492526	2927691	17984137	100.000
TOTAL ESTIMATE						

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-4LT

INVERTED CONSTRUCTION METHOD
FOUR LANE HIGHWAY TUNNEL
SITE 1 - 30' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of three estimates produced by computer extension for this study, to test the methods and results of the series of 176 estimates forming the basis of the study effort. Based on this series of estimates, a highway tunnel, at minimum depth, with precast concrete panel walls was chosen to test innovative basic construction methods. Traditional cut-and-cover construction (1-1LT), inverted construction (1-4LT) and combination (or partially inverted) construction (1-7LT) are compared under the same site and structure conditions. The relation of estimate 1-1LT in the series of 176 estimates is shown graphically in Table 1.



Note: Soil Profile same as for Project 1-1LY, Figure 3, Page 30.

Figure 14. PROJECT 1-4LT - INVERTED CONSTRUCTION HIGHWAY TUNNEL - SITE 1 - 30' DEPTH PRECAST CONCRETE PANELS - INTERNAL BRACING

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

	TOTAL COST ANALYSIS			PROJECT SUMMARY			
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	7766335	2162975	2958664	4348048	3492933	20728955	100.000
PROJECT						20728955	100.000

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

	TOTAL COST ANALYSIS				PROJECT SUMMARY		
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
4A00 1	CONST. BARRICADES ETC. 30 DA	28169 938.967	778 25.933	24922 830.733		53869 1795.633	.260 4A00 1
4A00 2	SET&MOVE BARRICADES ET 30 DA	19205 640.167	1812 60.400	4599 153.300		25616 853.867	.124 4A00 2
4A00 3	FLAGMEN-DIRECT TRAFFIC 280 DA	43322 154.721		3033 10.832		46355 165.554	.224 4A00 3
4A00	ITEM CONTROL TRAFFIC	90696	2590	32554		125840	.607 4A00 ITEM
4BD0 11	EXCAV SHAFTS @ INTER 8 EA	108667 13583.375	24082 3010.250	87716 10964.500		220465 27558.125	1.064 4BD0 11
4BD0 12	EXCAV UTILIDOR TUNNELS 4000 LF	1187360 296.840	605848 151.462	425325 106.331		2218533 554.633	10.703 4BD0 12
4BD0 13	CONC. UTILITY TUNNELS 4000 LF	407584 101.896	64264 16.066	99771 24.943	192415 48.104	764034 191.009	3.686 4BD0 13
4BD0 14	COMPL. & CLEAN TUNNELS 4000 LF	83229 20.807	21152 5.288	5826 1.457	94140 23.535	204347 51.087	.986 4BD0 14
4BD0 20	UTIL. SHAFT SERV. CREW 80 DA	94115 1176.438	30656 383.200	6588 82.350		131359 1641.988	.634 4BD0 20
4BD0 24	STORM DR&SEW. PERM. LONG 4000 LF				280000 70.000	280000 70.000	1.351 4BD0 24
4BD0 26	SEWER PERM. LONGIT. 4000 LF				96000 24.000	96000 24.000	.463 4BD0 26

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT

DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
4BD0 30 STM.DR.LATER.PERM.LONG 8 EA					2400 300.000	2400 300.000	.012 4BD0 30
4BD0 32 STM.DR.LATER.PERM.INT. 8 EA					2400 300.000	2400 300.000	.012 4BD0 32
4BD0 33 BLDG.SEW.LATERALS PERM 55 EA					3667 66.673	3667 66.673	.018 4BD0 33
4BD0 35 MANHOLES SEW.PERM.LONG 8 EA					9200 1150.000	9200 1150.000	.044 4BD0 35
4BD0 37 MANHOLES SEW.PERM.INT. 4 EA					9200 2300.000	9200 2300.000	.044 4BD0 37
4BD0 38 CATCH BASINS LONGIT. 8 EA					7600 950.000	7600 950.000	.037 4BD0 38
4BD0 39 CATCH BASINS INTER. 8 EA					7600 950.000	7600 950.000	.037 4BD0 39
4BD0 41 RELOCATE WAT.MAIN 30IN 2000 LF					275000 137.500	275000 137.500	1.327 4BD0 41
4BD0 42 WATER 8IN-TUN. INST. 4000 LF					140600 35.150	140600 35.150	.678 4BD0 42
4BD0 44 RELOCATE FIRE HYD.LONG 4 EA					10000 2500.000	10000 2500.000	.048 4BD0 44
4BD0 45 RELOCATE FIRE HYD.INT. 8 EA					20000 2500.000	20000 2500.000	.096 4BD0 45

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			PCTOT	
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL			
4800 51	RELOC.18IN. GAS MAIN 2000 LF				165000 82.500	165000 82.500		.796	4800 51
4800 55	6 IN. GAS-TUN. INST. 4000 LF				142000 35.500	142000 35.500		.685	4800 55
4800 61	TELEPH.CDT.-TUN. INST. 2000 LF				180000 90.000	180000 90.000		.868	4800 61
4800 64	TELEPHONE MANHOLE INT. 4 EA				79920 19980.000	79920 19980.000		.386	4800 64
4800 71	ELECT. CDT.-TUN. INST. 2000 LF				156000 78.000	156000 78.000		.753	4800 71
4800 73	ST.LT&TR.SIG.COND.INT. 4 EA				19000 4750.000	19000 4750.000		.092	4800 73
4800 74	STREET LIGHT TEMP.LONG 24 EA	5185 216.042	265 11.042	363 15.125	5813 242.208	5813 242.208		.028	4800 74
4800 75	STREET LIGHT PERM.LONG 24 EA	5185 216.042	265 11.042	363 15.125	5040 210.000	10853 452.208		.052	4800 75
4800 76	TR.SIG.CONTRL.TEMP INT 4 EA	5185 1296.250	265 66.250	363 90.750	8000 2000.000	13813 3453.250		.067	4800 76
4800 77	TR.SIG.CONTRL.PERM INT 4 EA	5185 1296.250	265 66.250	363 90.750	600 150.000	6413 1603.250		.031	4800 77
4800 78	PED.&TRAFFIC SIG.PERM. 4 EA	4387 1096.750	265 66.250	307 76.750	4800 1200.000	9759 2439.750		.047	4800 78

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
4BD0 80	CONN. BLDG. LATERALS 55 EA				110000 2000.000	110000 2000.000	.531
4BD0 85	CONN UTIL AT INT.SHAFT 8 EA	8028 1003.500	1778 222.250		60000 7500.000	95205 11900.625	.459
4BD0 ITEM	UTILIDORS & UTILITIES	1931481	628763	294555	1786027	5396181	26.032
4CD0 1	GENL EXTERIOR PROTECT 40 DA	21501 537.525	7550 188.750			36006 900.150	.174
4CD0 2	SIDEWALK VAULTS & WALLS 1000 LF	94179 94.179	21703 21.703	22979 22.979		156885 156.885	.757
4CD0 ITEM	PROTECT ADJ STRUCTURES	115680	29253	22979		192891	.931
4DDT 1	FURNISH,INSTALL&REMOVE				280634	280634	1.354
4DDT 2	MAINT SYST-FIRST 6 MOS 6 MO				189632 31605.333	189632 31605.333	.915
4DDT 3	MAINT SYST-AFTER 6 MOS 5 MO				168810 33762.000	168810 33762.000	.814
4DDT ITEM	CONTROL GROUND WATER				639076	639076	3.083
4FCT 1	MOB.SLURRY PLT,EQUIP. 30 DA	17083 569.433	1196 39.867			48769 1625.633	.235

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT 8R-30 FOOT DOT 1-4LT

		TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
		LA80R	EQPT	J08 MATL	PERM MATL	SU8-CONT				
4FCT 2	PRECAST YARD 45 DA	74580 1657.333	34887 775.267	5221 116.022	732651 16281.133	129260 2872.444	976599 21702.200	4.711	4FCT 2	
4FCT 3	TRENCH @ WALL LOCATION 4000 LF	88368 22.092	12400 3.100	77997 19.499			178765 44.691	.862	4FCT 3	
4FCT 4	EXCV SLOT FOR PANELS 11852 CY	71055 5.995	90758 7.658	4974 .420			166787 14.072	.805	4FCT 4	
4FCT 5	SET PRE-CAST PANELS 334 EA	108439 324.668	55095 164.955	24916 74.599			188450 564.222	.909	4FCT 5	
4FCT 6	OPERATE SLURRY EQUIP. 140 DA	183288 1309.200	41395 295.679	227140 1622.429			451823 3227.307	2.180	4FCT 6	
4FCT 7	DEMOBE.SLURRY EQUIP. 10 DA	9927 992.700	2816 281.600	695 69.500			13438 1343.800	.065	4FCT 7	
4FCT 9	CLN.PNL.& PATCH JT. 140 DA	55015 392.964	12343 88.164	12797 91.407			80155 572.536	.387	4FCT 9	
4FCT ITEM	GROUND SUPPORT WALL 13333 SY	607755 45.583	280184 21.014	354936 26.621	732651 54.950	129260 9.695	2104786 157.863	10.154	4FCT ITEM	
4GEN 1	SET BRACING LEVEL NO 2 524 TON	139803 266.800	49948 95.321	271786 518.676			461537 880.796	2.227	4GEN 1	
4GEN 2	PRESTRESS LEVEL NO 2 524 TON	28570 54.523	666 1.271	2000 3.817			31236 59.611	.151	4GEN 2	

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT

DOT 1-4LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
4GEN 14 REMOVE BRACING LEVEL 2 524 TON	53296 101.710	27718 52.897	3731 7.120			84745 161.727	.409
4GEN ITEM INTERNAL BRACING 524 TON	221669 423.032	78332 149.489	277517 529.613			577518 1102.134	2.786
4HEN 1 BREAK PAVEMENT & HAUL 14000 SY	32871 2.348	13680 .977	2301 .164			48852 3.489	.236
4HEN 2 EXCAVATE FIRST 5 FT 23300 CY	125744 5.397	60745 2.607	8802 .378			195291 8.382	.942
4HEN 11 2 SIDE RAMPS-BRK PAVE 960 SY	2818 2.935	1173 1.222	197 .205			4188 4.363	.020
4HEN 12 2 SIDE RAMPS-SOLD.PILE 2800 LF	37188 13.281	11942 4.265	46902 16.751			96032 34.297	.463
4HEN 13 2 SIDE RAMPS-LAGGING 15600 SF	22530 1.444	2067 .133	11917 .764			36514 2.341	.176
4HEN 14 2 SIDE RAMPS-EXCAVATE 3500 CY	15111 4.317	7299 2.085	1058 .302			23468 6.705	.113
4HEN 15 2 SIDE RAMPS-CONC SLAB 5 DA	6761 1352.200	690 138.000	6433 1286.600			13884 2776.800	.067
4HEN 21 "Y" DEVEL.AT RAMPS 11600 CY	42497 3.664	53526 4.614	2975 .256			98998 8.534	.478

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

		TOTAL COST ANALYSIS				PROJECT SUMMARY		
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
4HEN 22	GENL EXCAV UNDER ROOF 105000 CY	256228 2.440	337756 3.217	17936 .171			611920 5.828	2.952
4HEN 27	FINE GRADE INVERT 14000 SY	60183 4.299	27603 1.972	4213 .301			91999 6.571	.444
4HEN ITEM	EXCAVATION 139900 CY	601931 4.303	516481 3.692	102734 .734			1221146 8.729	5.891
4ICR 31	PREP FOR ROOF GRD BEAM 4000 LF	70695 17.674	9920 2.480	8099 2.025			88714 22.179	.428
4ICR 32	FORM ROOF GRADE BEAMS 4000 LF	47866 11.967		9931 2.483			57797 14.449	.279
4ICR 33	REINF FOR ROOF GR BEAM 180 TON	46150 256.389		3231 17.950	75600 420.000		124981 694.339	.603
4ICR 34	POUR ROOF GRADE BEAMS 2400 CY	74190 30.913	16345 6.810	5193 2.164	73250 30.521		168978 70.408	.815
4ICR 35	PRECAST YARD-ROOF BEAM 130 DA	215458 1657.369	116387 895.285	15082 116.015	1029057 7915.823	362800 2790.769	1738784 13375.262	8.388
4ICR 36	SET PRECAST ROOF PANEL 500 EA	115916 231.832	39199 78.398	30639 61.278			185754 371.508	.896
4ICR 37	CONSTRUCT PERM. STRUCT. 14000 SY					143500 10.250	143500 10.250	.692

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
4ICR 38	MORTAR PROT. FOR W.P. 1540 CY	3691 2.397	3479 2.259	59667 38.745		92544 60.094		.446	4ICR 38
4ICR 41	LEVELING SLAB FORMS 20 EA	11966 598.300	3988 199.400			15954 797.700		.077	4ICR 41
4ICR 42	POUR LEVELING SLAB 1540 CY	27040 17.558	2762 1.794	1893 1.229	45982 29.858	77677 50.440		.375	4ICR 42
4ICR 43	BASE SLAB REBAR, 1926 TON	347814 180.589	52229 27.118	24347 12.641	808920 420.000	1233310 640.348		5.950	4ICR 43
4ICR 44	BASE SLAB BLKHDS&WK.FM 18680 SF	111766 5.983	12599 .674			124365 6.658		.600	4ICR 44
4ICR 45	BASE SLAB-POUR, CLEANUP 25680 CY	135204 5.265	13808 .538	9464 .369	782310 30.464	940786 36.635		4.539	4ICR 45
4ICR 49	ASSEM. STL. WL&PL FRM 15 DA	16055 1070.333	1460 97.333	133924 8928.267		151439 10095.933		.731	4ICR 49
4ICR 51	WALL REBAR 128 TON	39106 305.516	2423 18.930	2737 21.383	53760 420.000	98026 765.828		.473	4ICR 51
4ICR 52	MOVE & SET STEEL FORMS 2000 LF	46589 23.295	15811 7.906			62400 31.200		.301	4ICR 52
4ICR 54	POUR CENTER WALLS 1700 CY	54080 31.812	5524 3.249	3786 2.227	52301 30.765	115691 68.054		.558	4ICR 54
4ICR 57	FORM PLENUM DECK 2000 LF	81576 40.788	8380 4.190			89956 44.978		.434	4ICR 57

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
4ICR 58	60160 250.667	2650 11.042	4211 17.546	76800 320.000		143821 599.254	.694
4ICR 59	55226 18.409	9466 3.155	3866 1.289	99574 33.225		168232 56.077	.812
4ICR 60	20218 101.090	1261 6.305	2105 10.525	12250 61.250		35834 179.170	.173
4ICR 61					230000	230000	1.110
4ICR 62					105000	105000	.507
4ICR 63	69143 .204		4840 .014	3985 .012		77968 .230	.376
4ICR 64	11829 591.450	662 33.100	828 41.400			13319 665.950	.064
4ICR ITEM	1683754 35.477	277787 5.853	308433 6.499	3173556 66.868	841300 17.727	6284830 132.424	30.319
4JEN 11	9620 6.413	1356 .904	673 .449	6000 4.000		17649 11.766	.085
4JEN 12	18952 5.415	2354 .673	1327 .379	14000 4.000		36633 10.467	.177
4JEN ITEM	28572 5.714	3710 .742	2000 .400	20000 4.000		54282 10.856	.262

DOT 1-4LT

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT 8R-30 FOOT

		TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
4K00 1	PLACE 6IN SUBGRADE 15400 SY	15925 1.034	4383 .285	1115 .072	19500 1.266		40923 2.657	.197	4K00 1	
4K00 2	PLACE 4IN BASE COURSE 15400 SY	15925 1.034	4383 .285	1115 .072	12300 .799		33723 2.190	.163	4K00 2	
4K00 3	STREET PAVING 15400 SY					48470 3.147	48470 3.147	.234	4K00 3	
4K00 5	BREAKOUT REM. SIDEWALK 5870 SY	13783 2.348	5736 .977	965 .164			20484 3.490	.099	4K00 5	
4K00 6	BF&TMP.SIDEWALK VAULTS 9852 CY	66686 6.769	8283 .841	4668 .474	40000 4.060		119637 12.143	.577	4K00 6	
4K00 7	PLACE 4IN SIDEWK.SU8GR 7785 SY	13416 1.723	3693 .474	939 .121	5200 .668		23248 2.986	.112	4K00 7	
4K00 8	PLACE 4IN CONC.SIDEWLK 7785 SY	45719 5.873		4340 .557	27307 3.508		77366 9.938	.373	4K00 8	
4K00 9	ACCESS WALKWAY 40 DA	18663 466.575	1325 33.125	5554 138.850			25542 638.550	.123	4K00 9	
4K00 ITEM	STREET RESTORATION 15400 SY	190117 12.345	27803 1.805	18696 1.214	104307 6.773	48470 3.147	389393 25.285	1.878	4K00 ITEM	
4N00 1	FIXED EXPENSE	78750	34000	208013			320763	1.547	4N00 1	
4N00 ITEM	OVERHEAD-FIXED COSTS	78750	34000	208013			320763	1.547	4N00 ITEM	

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-4LT

		TOTAL COST ANALYSIS			PROJECT SUMMARY			
		LA80R	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
40LN 1	OVERHEAD LA80R 35 MO	1193400 34097.143		83538 2386.800			1276938 36483.943	6.160 40LN 1
40LN 2	OVERHEAD EXPENSES 35 MO			367750 10507.143			367750 10507.143	1.774 40LN 2
40LN 3	GENERAL SERVICE CREW 600 DA	906000 1510.000	77004 128.340	63420 105.700			1046424 1744.040	5.048 40LN 3
40LN 4	VEHICLE OPERATION 35 MO		47250 1350.000				47250 1350.000	.228 40LN 4
40LN ITEM	OVERHEAD-TIME RELATED 35 MO	2099400 59982.857	124254 3550.114	514708 14705.943			2738362 78238.914	13.210 40LN ITEM
4P00 1	FIXED PLANT EXPENSES	116530	37500	185157		48800	387987	1.872 4P00 1
4P00 ITEM	PLANT-FIXED COSTS	116530	37500	185157		48800	387987	1.872 4P00 ITEM
4QLN 1	TIME RELATED COSTS 35 MO			295900 8454.286			295900 8454.286	1.427 4QLN 1
4QLN ITEM	PLANT-TIME RELATED 35 MO			295900 8454.286			295900 8454.286	1.427 4QLN ITEM

DOT 1-4LT

INVERTED CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT

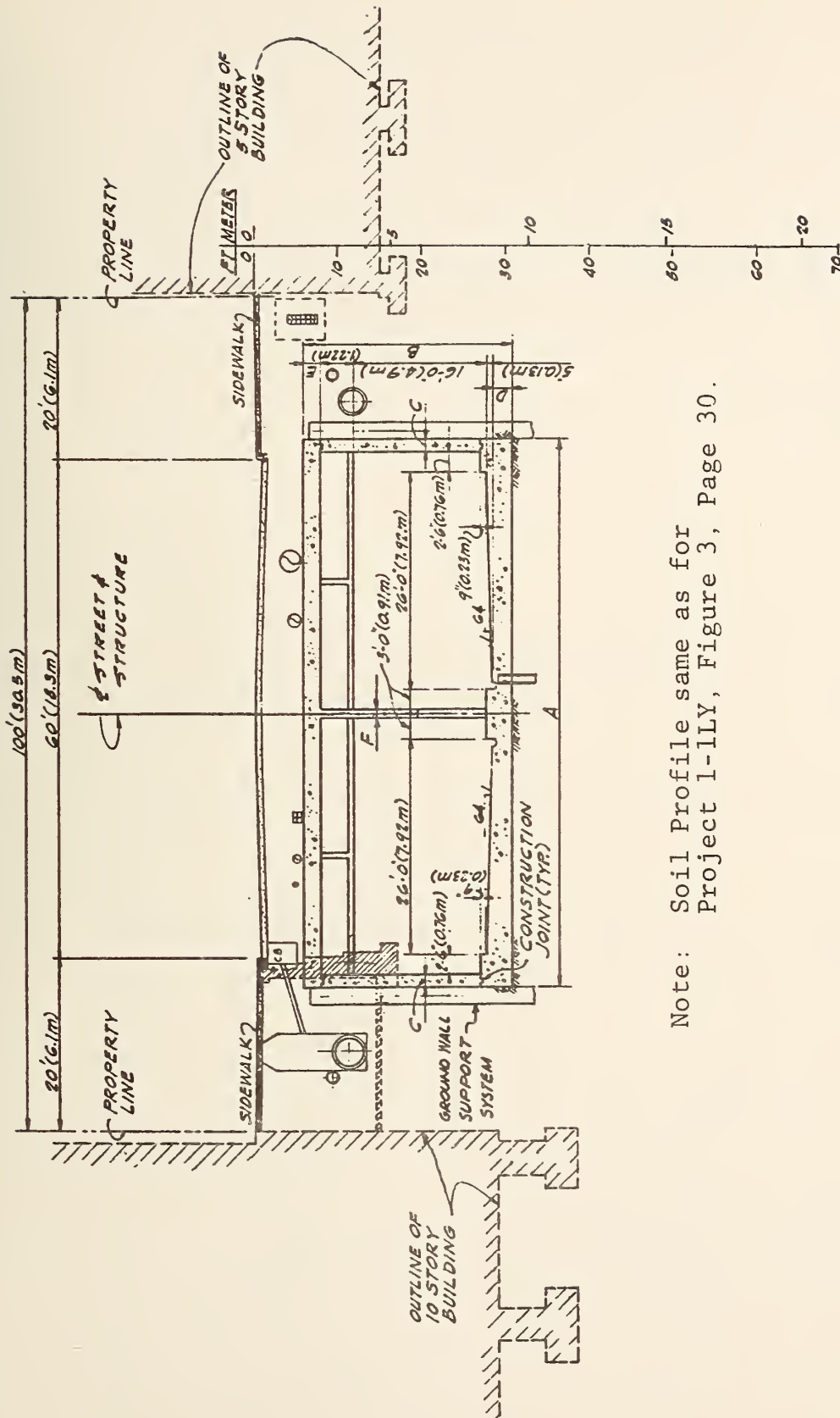
TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	7766335	2162975	2958664	4348048	3492933	20728955	100.000

SUMMARY ANALYSIS
OF
ESTIMATE DOT 1-7LT

PARTIALLY INVERTED CONSTRUCTION METHOD
FOUR LANE HIGHWAY TUNNEL
SITE 1 - 30' DEPTH
PRECAST CONCRETE PANEL GROUND SUPPORT
INTERNAL BRACING

This is one of three estimates produced by computer extension for this study, to test the methods and results of the series of 176 estimates forming the basis of the study effort. Based on this series of estimates, a highway tunnel, at minimum depth, with precast concrete panel walls was chosen to test innovative basic construction methods. Traditional cut-and-cover construction (1-1LT), inverted construction (1-4LT) and combination (or partially inverted) construction (1-7LT) are compared under the same site and structure conditions. The relation of estimate 1-1LT in the series of 176 estimates is shown graphically in Table 1.



Note: Soil Profile same as for Project 1-1LY, Figure 3, Page 30.

Figure 15. PROJECT 1-7LT - COMBINATION CONSTRUCTION HIGHWAY TUNNEL - SITE 1 - 30' DEPTH PRECAST CONCRETE PANELS - INTERNAL BRACING

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS		PROJECT SUMMARY				
LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
6423039	1252338	3859495	3500796	2903454	17939122	100.000
TOTAL ESTIMATE						
PROJECT						
						17939122 100.000

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
7A00 1 CONST.BARRICADES ETC. 45 DA	42253 938.956	1166 25.911	37713 838.067			81132 1802.933	.452
7A00 2 SET&MOVE BARRICADES ET 45 DA	28807 640.156	2718 60.400	5271 117.133			36796 817.689	.205
7A00 3 FLAGMEN-DIRECT TRAFFIC 210 DA	32491 154.719		2274 10.829			34765 165.548	.194
7A00 ITEM CONTROL TRAFFIC	103551	3884	45258			152693	.851
7BD1 1 ALL OPERATIONS	198151	18680	199450	8000	1719712	2143993	11.951
7BD1 ITEM UTILITY WORK-ALTERNATE	198151	18680	199450	8000	1719712	2143993	11.951
7CD0 1 GENL EXTERIOR PROTECT 40 DA	21501 537.525	6955 173.875	7550 188.750			36006 900.150	.201
7CD0 2 SIDEWALK VAULTS & WALLS 1000 LF	94179 94.179	18024 18.024	21703 21.703	22979 22.979		156885 156.885	.875
7CD0 ITEM PROTECT ADJ STRUCTURES	115680	24979	29253	22979		192891	1.075
7DDT 1 FURNISH, INSTALL&REMOVE					260634	260634	1.453
7DDT 2 MAINT SYST-FIRST 6 MOS 6 MO					149632 24938.667	149632 24938.667	.834

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT	
7DDT 3 MAINT SYST-AFTER 6 MOS 4 MO					103048	103048	.574	7DDT 3
					25762.000	25762.000		
7DDT ITEM CONTROL GROUND WATER					513314	513314	2.861	7DDT ITEM
7E00 1 CENTER PILE EXPL HOLE 168 EA	14847 88.375	2083 12.399	4339 25.827			21269 126.601	.119	7E00 1
7E00 2 DRILL HOLES-CENTR PILE 168 EA	37399 222.613	44294 263.655	2618 15.583			84311 501.851	.470	7E00 2
7E00 3 OPERATE SLURRY EQUIP 56 SH	24439 436.411	5520 98.571	4774 85.250			34733 620.232	.194	7E00 3
7E00 4 SPLICE, PLACE, TRIM, PILE 168 EA	34065 202.768	12555 74.732	82025 488.244			128645 765.744	.717	7E00 4
7E00 5 BACKFILL PILE HOLES 168 EA	14776 87.952	3706 22.060	14653 87.220			33135 197.232	.185	7E00 5
7E00 6 PILE CAPS, WALES, DECKBM 1865 TON	237227 127.199	51971 27.866	949106 508.904			1238304 663.970	6.903	7E00 6
7E00 7 LATERAL & SWAY BRACING 150 TON	77158 514.387	13850 92.333	110401 736.007			201409 1342.727	1.123	7E00 7
7E00 8 DECK MATS & TIMBERS 15333 SY	74747 4.875	5520 .360	541887 35.341			622154 40.576	3.468	7E00 8
7E00 9 REPOST DECK SUPPORT 168 EA	81144 483.000	25140 149.643	18280 108.810			124564 741.452	.694	7E00 9

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT 8R-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
7E00 11 REMOVE TIMBER DECKING 15333 SY	34974 2.281	5403 .352	2448 .160			42825 2.793	.239 7E00 11
7E00 12 RMV.DECK BMS.&INT.PILE 1859 TON	82189 44.211	35123 18.893	5753 3.095			123065 66.200	.686 7E00 12
7E00 13 REMOVE WALES & CAPS 450 TON	31832 70.738	13603 30.229	2228 4.951			47663 105.918	.266 7E00 13
7E00 14 REM.LAG.&PILES TO -6 4000 LF	31831 7.958	8611 2.153	2228 .557			42670 10.668	.238 7E00 14
7E00 ITEM STREET DECKING 15333 SY	776628 50.651	227379 14.829	1740740 113.529			2744747 179.009	15.300 7E00 ITEM
7FCT 1 MOB.SLURRY PLT,EQUIP. 30 DA	17083 569.433	30490 1016.333	1196 39.867			48769 1625.633	.272 7FCT 1
7FCT 2 PRECAST YARD 45 DA	74580 1657.333	34887 775.267	5221 116.022	732552 16278.933	129260 2872.444	976500 21700.000	5.443 7FCT 2
7FCT 3 TRENCH @ WALL LOCATION 4000 LF	88368 22.092	12400 3.100	77997 19.499			178765 44.691	.997 7FCT 3
7FCT 4 EXCV SLOT FOR PANELS 11852 CY	71055 5.995	90758 7.658	4974 .420			166787 14.072	.930 7FCT 4
7FCT 5 SET PRE-CAST PANELS 334 EA	108439 324.668	55095 164.955	24916 74.599			188450 564.222	1.050 7FCT 5

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT 8R-30 FOOT DOT 1-7LT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LA80R	EQPT	JOB MATL	PERM MATL	SUB-CONT				
7FCT 6 OPERATE SLURRY EQUIP. 140 DA	183288 1309.200	41395 295.679	227140 1622.429				451823 3227.307	2.519	7FCT 6
7FCT 7 DEMOBE.SLURRY EQUIP. 10 DA	992.700	281.600	69.500				1343.800	.075	7FCT 7
7FCT 8 PLACE LAGGING 1ST.10FT 40000 SF	57770 1.444	5299 .132	30444 .761				93513 2.338	.521	7FCT 8
7FCT 9 CLN.PNL.& PATCH JT. 140 DA	55015 392.964	12343 88.164	12797 91.407				80155 572.536	.447	7FCT 9
7FCT ITEM GROUND SUPPORT WALL 13333 SY	665525 49.916	285483 21.412	385380 28.904	732552 54.943	129260 9.695		2198200 164.869	12.254	7FCT ITEM
7GEN 1 SET BRACING LEVEL NO 2 524 TON	98787 188.525	28816 54.992	268915 513.197				396518 756.714	2.210	7GEN 1
7GEN 2 PRESTRESS LEVEL NO 2 524 TON	22754 43.424	530 1.011	1593 3.040				24877 47.475	.139	7GEN 2
7GEN 14 REMOVE BRACING LEVEL 2 524 TON	38662 73.782	16237 30.987	2706 5.164				57605 109.933	.321	7GEN 14
7GEN ITEM INTERNAL BRACING 524 TON	160203 305.731	45583 86.990	273214 521.401				479000 914.122	2.670	7GEN ITEM
7HEN 1 BREAK PAVEMENT & HAUL 14000 SY	32871 2.348	13680 .977	2301 .164				48852 3.489	.272	7HEN 1

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

		TOTAL COST ANALYSIS				PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SU8-CONT	TOTAL	PCTOT		
7HEN 2	EXCAVATE FIRST 5 FT 23300 CY	125744 5.397	60745 2.607	8802 .378			195291 8.382	1.089	7HEN 2	
7HEN 3	EXCAVATE 5 TO 22 FT 79300 CY	201739 2.544	151609 1.912	14122 .178			367470 4.634	2.048	7HEN 3	
7HEN 4	EXCAVATE 22 TO 30 FT 37300 CY	91770 2.460	98949 2.653	6424 .172			197143 5.285	1.099	7HEN 4	
7HEN 7	FINE GRADE INVERT 14000 SY	60183 4.299	27603 1.972	4213 .301			91999 6.571	.513	7HEN 7	
7HEN 8	EXC.&SUPP.ACCESS SHAFT 2 EA	108667 54333.500	23244 11622.000	45175 22587.500			177086 88543.000	.987	7HEN 8	
7HEN ITEM	EXCAVATION 139900 CY	620974 4.439	375830 2.686	81037 .579			1077841 7.704	6.008	7HEN ITEM	
7ICR 1	LEVELING SLAB FORMS 20 EA	11966 598.300		3988 199.400			15954 797.700	.089	7ICR 1	
7ICR 2	POUR LEVELING SLAB 1540 CY	27040 17.558	2762 1.794	1893 1.229	45982 29.858		77677 50.440	.433	7ICR 2	
7ICR 3	BASE SLAB REBAR, 1926 TON	331847 172.299	23735 12.323	23229 12.061	808920 420.000		1187731 616.683	6.621	7ICR 3	
7ICR 4	BASE SLAB 8LKHDS&WK.FM 18680 SF	111766 5.983		12599 .674			124365 6.658	.693	7ICR 4	

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

	TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
7ICR 5	BASE SLAB-POUR,CLEANUP 25680 CY	135204 5.265	13808 .538	9464 .369	782310 30.464		940786 36.635	5.244	7ICR 5
7ICR 9	ASSEM.STL.WL&RF&PL FRM 15 DA	16055 1070.333	1460 97.333	137124 9141.600			154639 10309.267	.862	7ICR 9
7ICR 11	WALL REBAR 128 TON	39106 305.516	2423 18.930	2737 21.383	53760 420.000		98026 765.828	.546	7ICR 11
7ICR 12	MOVE & SET STEEL FORMS 2000 LF	423539 211.770		42198 21.099			465737 232.869	2.596	7ICR 12
7ICR 13	ROOF SLAB REBAR 721 TON	171282 237.562	10613 14.720	11990 16.630	302820 420.000		496705 688.911	2.769	7ICR 13
7ICR 14	POUR WALLS & ROOF SLAB 11320 CY	135204 11.944	13808 1.220	9464 .836	345740 30.542		504216 44.542	2.811	7ICR 14
7ICR 15	PLACE ROOF WATERPROOF 14000 SY					143500 10.250	143500 10.250	.800	7ICR 15
7ICR 16	MORTAR PROT.FOR W.P. 1540 CY	25707 16.693	3691 2.397	3479 2.259	59667 38.745		92544 60.094	.516	7ICR 16
7ICR 17	FORM PLENUM DECK 2000 LF	81576 40.788		8380 4.190			89956 44.978	.501	7ICR 17
7ICR 18	PLEN.DECK REBAR 240 TON	72192 300.800	3180 13.250	5053 21.054	76800 320.000		157225 655.104	.876	7ICR 18
7ICR 19	POUR PLENUM DECK 3000 CY	69032 23.011	11832 3.944	4832 1.611	99674 33.225		185370 61.790	1.033	7ICR 19

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

		TOTAL COST ANALYSIS				PROJECT SUMMARY			TOTAL	PCTOT
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT				
7ICR 20	CONST.PLENUM DIV. WALL 200 CY	25272 126.360	1576 7.880	2459 12.295	12250 61.250			41557 207.785	.232	7ICR 20
7ICR 21	ELECTRICAL EMBEDDED					230000		230000	1.282	7ICR 21
7ICR 22	MECHANICAL EMBEDDED					105000		105000	.585	7ICR 22
7ICR 23	PATCH&POINT CONC.WORK 339000 SF	81347 .240	5694 .017	3985 .012				91026 .269	.507	7ICR 23
7ICR 24	CLEAN UP STRUCTURE 20 DA	11829 591.450	662 33.100	828 41.400				13319 665.950	.074	7ICR 24
7ICR ITEM	CONSTRUCT PERM. STRUCT. 41740 CY	1769964 42.405	89550 2.145	285411 6.838	2591908 62.097	478500 11.464		5215333 124.948	29.072	7ICR ITEM
7JEN 4	BACKFILL & TMP.TOP 5FT 9300 CY	62950 6.769	7819 .841	4407 .474	37200 4.000			112376 12.083	.626	7JEN 4
7JEN 5	BACKFILL ACCESS SHAFTS 1800 CY	11543 6.413	1627 .904	808 .449	7200 4.000			21178 11.766	.118	7JEN 5
7JEN ITEM	BACKFILL 11100 CY	74493 6.711	9446 .851	5215 .470	44400 4.000			133554 12.032	.744	7JEN ITEM
7K00 1	PLACE 6IN SUBGRADE 13850 SY	14321 1.034	3942 .285	1002 .072	17350 1.253			36615 2.644	.204	7K00 1
7K00 2	PLACE 4IN BASE COURSE 13850 SY	14321 1.034	3942 .285	1002 .072	11100 .801			30365 2.192	.169	7K00 2

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

		TOTAL COST ANALYSIS				PROJECT SUMMARY				
		LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT		
7K00 3	STREET PAVING 13850 SY					43868 3.167	43868 3.167	.245	7K00 3	
7K00 5	BREAKOUT REM. SIDEWALK 5870 SY	13783 2.348	5736 .977	965 .164			20484 3.490	.114	7K00 5	
7K00 6	BF&TMP.SIDEWALK VAULTS 9852 CY	66686 6.769	8283 .841	4668 .474	40000 4.060		119637 12.143	.667	7K00 6	
7K00 7	PLACE 4IN SIDEWK.SUBGR 7785 SY	13416 1.723	3693 .474	939 .121	5200 .668		23248 2.986	.130	7K00 7	
7K00 8	PLACE 4IN CONC.SIDEWLK 7785 SY	45719 5.873		4340 .557	27307 3.508		77366 9.938	.431	7K00 8	
7K00 9	ACCESS WALKWAY 40 DA	18663 466.575	1325 33.125	5554 138.850			25542 638.550	.142	7K00 9	
7K00 ITEM	STREET RESTORATION 13850 SY	186909 13.495	26921 1.944	18470 1.334	100957 7.289	43868 3.167	377125 27.229	2.102	7K00 ITEM	
7N00 1	FIXED EXPENSE	67200	30000	165704			262904	1.466	7N00 1	
7N00 ITEM	OVERHEAD-FIXED COSTS	67200	30000	165704			262904	1.466	7N00 ITEM	
70LN 1	OVERHEAD LABOR 28 MO	876200 31292.857		61334 2190.500			937534 33483.357	5.226	70LN 1	
70LN 2	OVERHEAD EXPENSES 28 MO			295400 10550.000			295400 10550.000	1.647	70LN 2	

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS PROJECT SUMMARY

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
70LN 3 GENERAL SERVICE CREW 480 DA	724801 1510.002	61603 128.340	50736 105.700			837140 1744.042	4.667 70LN 3
70LN 4 VEHICLE OPERATION 28 MO		28000 1000.000				28000 1000.000	.156 70LN 4
70LN ITEM OVERHEAD-TIME RELATED 28 MO	1601001 57178.607	89603 3200.107	407470 14552.500			2098074 74931.214	11.696 70LN ITEM
7P00 1 FIXED PLANT EXPENSES	82760	25000	79793		18800	206353	1.150 7P00 1
7P00 ITEM PLANT-FIXED COSTS	82760	25000	79793		18800	206353	1.150 7P00 ITEM
7QLN 1 TIME RELATED COSTS 28 MO			143100 5110.714			143100 5110.714	.798 7QLN 1
7QLN ITEM PLANT-TIME RELATED 28 MO			143100 5110.714			143100 5110.714	.798 7QLN ITEM

COMBINATION CONSTRUCTION-HIGHWAY TUNNEL-SITE 1-PRECAST WALL-INT BR-30 FOOT DOT 1-7LT

TOTAL COST ANALYSIS

	LABOR	EQPT	JOB MATL	PERM MATL	SUB-CONT	TOTAL	PCTOT
TOTAL ESTIMATE	6423039	125233B	3859495	3500796	2903454	17939122	100.000







FEDERALLY COORDINATED PROGRAM OF HIGHWAY RESEARCH AND DEVELOPMENT (FCP)

The Offices of Research and Development of the Federal Highway Administration are responsible for a broad program of research with resources including its own staff, contract programs, and a Federal-Aid program which is conducted by or through the State highway departments and which also finances the National Cooperative Highway Research Program managed by the Transportation Research Board. The Federally Coordinated Program of Highway Research and Development (FCP) is a carefully selected group of projects aimed at urgent, national problems, which concentrates these resources on these problems to obtain timely solutions. Virtually all of the available funds and staff resources are a part of the FCP, together with as much of the Federal-aid research funds of the States and the NCHRP resources as the States agree to devote to these projects.*

FCP Category Descriptions

1. Improved Highway Design and Operation for Safety

Safety R&D addresses problems connected with the responsibilities of the Federal Highway Administration under the Highway Safety Act and includes investigation of appropriate design standards, roadside hardware, signing, and physical and scientific data for the formulation of improved safety regulations.

2. Reduction of Traffic Congestion and Improved Operational Efficiency

Traffic R&D is concerned with increasing the operational efficiency of existing highways by advancing technology, by improving designs for existing as well as new facilities, and by keeping the demand-capacity relationship in better balance through traffic management techniques such as bus and carpool preferential treatment, motorist information, and rerouting of traffic.

3. Environmental Considerations in Highway Design, Location, Construction, and Operation

Environmental R&D is directed toward identifying and evaluating highway elements which affect the quality* of the human environment. The ultimate goals are reduction of adverse highway and traffic impacts, and protection and enhancement of the environment.

4. Improved Materials Utilization and Durability

Materials R&D is concerned with expanding the knowledge of materials properties and technology to fully utilize available naturally occurring materials, to develop extender or substitute materials for materials in short supply, and to devise procedures for converting industrial and other wastes into useful highway products. These activities are all directed toward the common goals of lowering the cost of highway construction and extending the period of maintenance-free operation.

5. Improved Design to Reduce Costs, Extend Life Expectancy, and Insure Structural Safety

Structural R&D is concerned with furthering the latest technological advances in structural designs, fabrication processes, and construction techniques, to provide safe, efficient highways at reasonable cost.

6. Prototype Development and Implementation of Research

This category is concerned with developing and transferring research and technology into practice, or, as it has been commonly identified, "technology transfer."

7. Improved Technology for Highway Maintenance

Maintenance R&D objectives include the development and application of new technology to improve management, to augment the utilization of resources, and to increase operational efficiency and safety in the maintenance of highway facilities.

* The complete 7-volume official statement of the FCP is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161 (Order No. 2B 242057, price \$45 postpaid). Single copies of the introductory volume are obtainable without charge from Program Analysis (HRD-2), Offices of Research and Development, Federal Highway Administration, Washington, D.C. 20590.

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