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Hot Bituminous Pavement QC&QA Projects Constructed in 1997 Under QPM 2 Specifications

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**Prepared in Cooperation with the
U.S. Department of Transportation
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13. ABSTRACT (Maximum 200 words) This report presents Tables and Figures which summarize the HBP Quality Level Analysis (QL) for QC&QA projects completed in 1997, the third season using the current specifications. The Quality Level (QL) for the elements (sieve analysis, asphalt content, and pavement density) and the item composites are summarized. While QL determines Pay Factor(PF), it is also used to rank contractors' performance. The item QL improved in 1997 over 1996. Incentive/disincentive payments were not sufficient to cause some contractors to improve their process control. Both, the better and poorer performing contractors show up with similar rankings from year to year. The QL specifications essentially are serving satisfactorily. This is the final report in this series. Implementation: No significant changes are recommended for the HBP QC&QA program.			
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CDOT REPORT FOR THE HBP QC/QA PROJECTS
CONSTRUCTED IN 1997 UNDER QPM 2 SPECIFICATIONS**

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INTRODUCTION AND COMMENTS

CDOT began QC&QA construction for hot bituminous pavement (HBP) in 1992 with the implementation of a three-year pilot program which was essentially completed in 1994 (several projects were held over and completed in 1995). The Pilot project computer software was designated QPM 1 and that designation is used herein to designate projects built under the Pilot specifications ⁽¹⁾.

In 1994 a revised and updated specification was written, designated as QPM 2 ⁽²⁾. It was used on a few projects completed in 1995 and essentially all HBP projects completed in 1996 and 1997. Reports have been made for 1992 through 1996 ⁽³⁻⁷⁾. These are available from the CDOT library, or from the Pavement Unit in the Central Laboratory. The 1995 construction report ⁽⁶⁾ contained summaries for both QPM 1 & 2.

By comparing the bid summaries and other available information in the Central laboratory, it appears only 35 to 40% of the projects completed in 1997 were reported. Because of this, consider the trends, quality levels, and other summary information herein as only showing trends. It approximately represents 1997 QC&QA

The general format and presentation of data in this Sixth Annual report are similar to that used in the other QC&QA reports. Information on the background, development, philosophy and rationale involved can be found in the previous reports and is not being repeated here. The total tons reported each year under each specification and the summarized data can be found in Tables 4 and 5. Also, relationships of yearly summaries to the 1991 historical base are defined in the tables and Figures 1 through 4.

DISCUSSION OF THE DATA

Description of Tables and Figures.

Table 1, comprising three pages, is a listing of each complete process (referred to in the column heading as Mix Design) summary. Each element (asphalt content, density and gradation) is listed, along with a composite calculation (Totals & Weighed Means) for the applicable columns. Tons, test "n" and the incentive or disincentive payments (I/DP) are totaled. Quality Level (QL) and pay factor (PF) are the averages of the element values weighted by their "W" factors (see previous reports and the QPM 2 specifications). Project summaries are listed numerically by subaccount number (SA) and mix design numbers. Table 1 is the summarized construction data for projects reported.

Element and mix design item summaries (composite) have been grouped separately in Table 2. The data is listed by SA. Each element is totaled and averaged (weighted by tons). The final grouping is the Item composite. It gives summaries for all projects reported for the 1997 season. Table 2 data, except the summary at the end of each group, is the same as in Table 1. It has been sorted differently, by element, and the composite data is listed separately.

Summary values from Table 2 have been transferred to Tables 3 and 3A. The composited item data for each process sorted in descending order by QL is in Table 3. Processes have been grouped by contractor in Table 3A and the groups sorted by QL, in descending order. Where there was more than one process per contractor, the total tons, and weighted PF and QL averages for the group are listed.

Summarized element and composite data, 1991 historical and QC&QA 1992 through 1997 are in Table 4. Included are the overall summaries for all QPM 1 and all QPM 2 projects. The tons and number of tests for each group are listed. Table 4 data is shown again in Table 5, but presented in a different mode. It groups the elements and composites together. In Table 5, data has been "normalized" by comparing each element for each year with the historical data, which is shown as a percentage of 1991.

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The "SD, % of '91" column is the only "% of 1991" column where less than 100% shows an improvement. A lower percentage means a smaller SD, a desirable condition. For the other columns, more than 100% is an improvement from 1991. The "All QPM 2 Composite" line shows a continued and significant improvement from 1991 base data. Figures 1 through 4 are plotted from data in Table 5.

A large amount of information is contained in Table 6. It tabulates the following data for each of the six QC&QA construction years (1992-1997) for the 28 participating contractors: (1) Quality Level, (2) percent of a given contractor's production that was in Red (i.e., QL less than 65), (3) the total tons for each contractor for the year, (4) the weighted averages for QPM 1 and 2 and (5) for all (QC&QA). Figures 5 through 10 show the table data graphically. Table 6A is an abbreviated version of the data for easier reading. Only summaries for QPM 1, QPM 2 and the totals for each contractor are given.

Figures 11- 16 are frequency histograms of 1996 and 1997 element test values. For asphalt content and the No. 8 sieve (usually the controlling sieve for the gradation element), the field test values for each process were adjusted to a common target value (average for the year). The Density test target was 94, the same for all processes, so no adjustment was necessary.

Significance of Data and Comments

Contractors' QL ranking, along with tonnage represented is of interest to many. A review of the 1993 - 1997 reports shows that, annually, most of the same contractors show up with similar QL rankings. The better performers repeat year after year, and likewise, so do the poor performers. Occasionally extenuating circumstances, such as experimental projects or other factors, shift the rankings. Apparently, the incentives and disincentives are not enough to persuade some contractors to produce at a higher level. Competition will not always guarantee the most efficient contractors will be the lowest bidders. Factors other than competition may be involved, such as location of the new project in relation to the bidder's home base or current project.

From Tables 4 and 5, the Asphalt % and Density QLs, have improved significantly in 1997 above 1996. Gradation QL is lower, reflecting the low "W" factor of 0.2. Still, the 1997 composite QL is higher than 1996. For most contractors there were significant improvements, but a few contractors with low QLs lowered the yearly average.

Figures 11 and 12, field test results for asphalt content, show consistent, good distribution in 1996 and 1997. Figures 13 and 14, for asphalt density, show the distribution for 1997 has improved above 1996. For the first time, the distribution at the lower limit of 92 is normal. In all previous years, the percentages just above 92 were higher than normal, and just below, less than normal. This condition shows a bias in sample selection (not purely random). Continued training in random sampling methods appears finally to be paying off. The 1997 No.8 sieve distribution histogram shows some improvement from 1996.

This will be the final report in this series on QC&QA for HBP. The program is continuing satisfactorily. Minor wording changes in the specification may be made as it is fine tuned. Computer software is continually being updated and improved. No major changes are recommended.

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REFERENCES

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2. Revision of Sections 105 and 106, Quality of Hot Bituminous Pavement, April 25, 1995 (Reissued with minor editorial changes, March 7, 1996). CDOT, 4201 East Arkansas Avenue, Denver, CO 80222. (QPM 2)
3. HBP QA/QC Pilot Projects Construction in 1992, Interim Report. Report No. CDOT-DTD-R-93-14, by Bud A. Brakey, Colorado Department of Transportation, 4201 East Arkansas Avenue, Denver, CO 80222.
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7. HBP QC&QA Projects Constructed in 1996 Under QPM 2 Specifications, (May 1997, fifth annual report by Bud A. Brakey, Colorado Department of Transportation, 4201 East Arkansas Avenue, Denver, CO 80222), Report No. CDOT-R-97-9.

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TABLES AND FIGURES COMPRISING 17 PAGES NUMBERED 5 - 21.

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**TABLE 1
HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY PROJECT
AND MIX DESIGN FOR 1997 CONSTRUCTION SEASON USING QPM 97W**

PROJECT LOCATION	REG/ UNIT	SUBAC NUMBR	MIX DESIGN	ELE- MENT	BID \$/TON	TONS 1000	TEST "n"	PRCESS SD	MEAN -TC	QUAL LEVL	PAY FACT	Incent/ Disinc\$	Contr Code	HBP Agg
HH 0702-193		10093	60128	a									E1	SIF
Gypsum-Eagle	3	10093	60128	AC%	\$24.85	5.03	5	0.20	-0.10	83.7	1.022	\$812	E1	SIF
Gypsum-Eagle	3	10093	60128	Dn%	\$24.85	NA	0	NA	0.00	NA	1.000	\$0	E1	SIF
Gypsum-Eagle	3	10093	60128	Grad	\$24.85	5.03	3	1.20	-0.70	71.5	1.007	\$168	E1	SIF
TOTALS & WTED MEANS		10093	60128	ITEM	\$24.85	5.03	NA	NA	NA	78.8	1.016	\$981	E1	SIF
HH 0702-193		10093	60128A	a									E1	SIF
Gypsum-Eagle	3	10093	60128A	AC%	\$24.85	30.26	31	0.14	-0.06	95.6	1.048	\$10,805	E1	SIF
Gypsum-Eagle	3	10093	60128A	Dn%	\$24.85	NA	0	NA	0.00	NA	1.000	\$0	E1	SIF
Gypsum-Eagle	3	10093	60128A	Grad	\$24.85	30.26	16	0.80	-0.40	88.7	1.018	\$2,765	E1	SIF
TOTALS & WTED MEANS		10093	60128A	ITEM	\$24.85	30.26	NA	NA	NA	92.8	1.036	\$13,570	E1	SIF
STU M356-004		10391	R60072	a									B3	C
120th and Huron	6	10391	R60072	AC%	\$35.00	3.50	3	0.14	0.07	100.0	1.025	\$919	B3	C
120th and Huron	6	10391	R60072	Dn%	\$35.00	3.50	7	1.08	-0.41	94.3	1.035	\$2,144	B3	C
120th and Huron	6	10391	R60072	Grad	\$35.00	3.50	2	NA	3.00	NA	1.000	\$0	B3	C
TOTALS & WTED MEANS		10391	R60072	ITEM	\$35.00	3.50	NA	NA	NA	96.4	1.025	\$3,062	B3	C
PLH 0503-047		10934	109341	a									A2	C
Parkdale - West	2	10934	109341	AC%	\$38.75	3.60	4	0.19	-0.06	92.4	1.030	\$1,254	A2	C
Parkdale - West	2	10934	109341	Dn%	\$38.75	3.60	8	1.09	0.54	91.8	1.037	\$2,603	A2	C
Parkdale - West	2	10934	109341	Grad	\$38.75	3.60	2	NA	3.00	NA	1.000	\$0	A2	C
TOTALS & WTED MEANS		10934	109341	ITEM	\$38.75	3.60	NA	NA	NA	92.0	1.028	\$3,857	A2	C
PLH 0503-047		10934	109341	a									A2	C
Parkdale - West	2	10934	109341	AC%	\$38.75	20.17	21	0.17	-0.03	91.8	1.029	\$6,684	A2	C
Parkdale - West	2	10934	109341	Dn%	\$38.75	20.17	41	0.88	-0.08	98.1	1.055	\$21,497	A2	C
Parkdale - West	2	10934	109341	Grad	\$38.75	20.17	11	3.00	6.20	92.5	1.040	\$6,244	A2	C
TOTALS & WTED MEANS		10934	109341	ITEM	\$38.75	20.17	NA	NA	NA	95.1	1.044	\$34,425	A2	C
Br 3851-010		11233	88550	a									A3	CX
Six Miles S of SH 40	1	11233	88550	AC%	\$45.00	1.89	2	NA	-0.06	NA	1.000	\$0	A3	CX
Six Miles S of SH 40	1	11233	88550	Dn%	\$45.00	1.89	5	0.82	-0.72	97.4	1.030	\$1,276	A3	CX
Six Miles S of SH 40	1	11233	88550	Grad	\$45.00	1.89	2	NA	3.00	NA	1.000	\$0	A3	CX
TOTALS & WTED MEANS		11233	88550	ITEM	\$45.00	1.89	NA	NA	NA	97.4	1.015	\$1,276	A3	CX
MC 006A 024		11338	81341	a									E1	CX
US 6, Machine Patch	3	11338	81341	AC%	\$40.00	5.58	6	0.22	-0.00	86.3	1.024	\$1,613	E1	CX
US 6, Machine Patch	3	11338	81341	Dn%	\$40.00	5.58	12	1.15	-1.14	76.8	0.955	(\$5,020)	E1	CX
US 6, Machine Patch	3	11338	81341	Grad	\$40.00	5.58	3	2.50	2.70	66.7	0.987	(\$574)	E1	CX
TOTALS & WTED MEANS		11338	81341	ITEM	\$40.00	5.58	NA	NA	NA	77.6	0.982	(\$3,981)	E1	CX
IM 0703-231		11350	98056	a									W2	S
Eisenhower Tunnel-West	1	11350	98056	AC%	\$25.00	83.15	84	0.17	0.01	92.6	1.018	\$10,948	W2	S
Eisenhower Tunnel-West	1	11350	98056	Dn%	\$25.00	83.15	167	1.03	0.27	94.1	1.025	\$25,804	W2	S
Eisenhower Tunnel-West	1	11350	98056	Grad	\$25.00	83.15	42	2.30	0.30	90.5	1.010	\$4,230	W2	S
TOTALS & WTED MEANS		11350	98056	ITEM	\$25.00	83.15	NA	NA	NA	92.9	1.020	\$40,981	W2	S
IM 0252-292		11365	R6016	a									K1	C
I 25, Colo Blvd-South	6	11365	R6016	AC%	\$36.00	28.35	29	0.16	-0.02	93.8	1.037	\$11,404	K1	C
I 25, Colo Blvd-South	6	11365	R6016	Dn%	\$36.00	28.35	57	1.17	-0.66	86.4	0.974	(\$13,231)	K1	C
I 25, Colo Blvd-South	6	11365	R6016	Grad	\$36.00	28.35	15	1.80	-0.40	91.8	1.032	\$6,607	K1	C
TOTALS & WTED MEANS		11365	R6016	ITEM	\$36.00	28.35	NA	NA	NA	89.7	1.005	\$4,780	K1	C
NH 0403-024		11628	97811	a									E1	S
Moffat Tunnel-Clear Creek	1	11628	97811	AC%	\$18.00	24.61	25	0.13	-0.05	97.3	1.050	\$6,644	E1	S
Moffat Tunnel-Clear Creek	1	11628	97811	Dn%	\$18.00	24.61	50	0.76	-0.46	98.0	1.055	\$12,181	E1	S
Moffat Tunnel-Clear Creek	1	11628	97811	Grad	\$18.00	24.61	13	2.30	-0.10	93.2	1.039	\$3,482	E1	S
TOTALS & WTED MEANS		11628	97811	ITEM	\$18.00	24.61	NA	NA	NA	96.8	1.050	\$22,308	E1	S

TABLE 1
HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY PROJECT
AND MIX DESIGN FOR 1997 CONSTRUCTION SEASON USING QPM 97W

PROJECT LOCATION	REG/ UNIT	SUBAC NUMBR	MIX DESIGN /PRCSS	ELE- MENT	BID \$/TON	TONS 1000	TEST "n"	PRCSS SD	MEAN -TC	QUAL LEVL	PAY FACT	Incent/ Disinc\$	Contr Code	HBP Agg
C 0911-003		11706	603397	a									H1	S
Copper Mountain-South	1	11706	603397	AC%	\$24.04	19.22	20	0.10	0.10	98.1	1.050	\$6,931	H1	S
Copper Mountain-South	1	11706	603397	Dn%	\$24.04	19.22	39	0.89	-0.64	93.8	1.034	\$7,784	H1	S
Copper Mountain-South	1	11706	603397	Grad	\$24.04	19.22	10	2.10	2.70	54.7	0.801	(\$18,401)	H1	S
TOTALS & WTED MEANS		11706	603397	ITEM	\$24.04	19.22	NA	NA	NA	87.3	0.992	(\$3,685)	H1	S
IM 0252-303		11765	98203	a									S1	C
Tomaha Road North	1	11765	98203	AC%	\$36.16	33.38	34	0.14	0.13	89.0	1.003	\$1,198	S1	C
Tomaha Road North	1	11765	98203	Dn%	\$36.16	33.38	67	0.83	-0.49	96.6	1.050	\$30,050	S1	C
Tomaha Road North	1	11765	98203	Grad	\$36.16	33.38	17	3.30	-0.50	75.9	0.934	(\$16,008)	S1	C
TOTALS & WTED MEANS		11765	98203	ITEM	\$36.16	33.38	NA	NA	NA	90.2	1.013	\$15,241	S1	C
NH 0243-053		11773	102007	a									K1	S
Bridge Remov, CRI&P RR	1	11773	102007	AC%	\$58.10	3.77	8	0.12	0.11	95.0	1.040	\$2,628	K1	S
Bridge Remov, CRI&P RR	1	11773	102007	Dn%	\$58.10	3.77	8	0.94	-0.58	94.8	1.040	\$4,381	K1	S
Bridge Remov, CRI&P RR	1	11773	102007	Grad	\$58.10	3.77	4	1.30	-3.70	83.1	1.030	\$1,302	K1	S
TOTALS & WTED MEANS		11773	102007	ITEM	\$58.10	3.77	NA	NA	NA	92.5	1.038	\$8,312	K1	S
IM 0705-067		11779	68220	a									W2	S
Bethune East	1	11779	68220	AC%	\$35.00	26.75	27	0.14	0.03	96.8	1.055	\$15,450	W2	S
Bethune East	1	11779	68220	Dn%	\$35.00	26.75	54	1.00	-0.80	89.9	1.002	\$1,088	W2	S
Bethune East	1	11779	68220	Grad	\$35.00	26.75	14	1.40	-0.60	86.5	1.006	\$1,090	W2	S
TOTALS & WTED MEANS		11779	68220	ITEM	\$35.00	26.75	NA	NA	NA	91.3	1.019	\$17,627	W2	S
C R200-056		11786	90497	a									G1	S
Lamar Area, Mach Patch	2	11786	90497	AC%	\$30.30	13.81	14	0.21	-0.01	86.0	1.003	\$375	G1	S
Lamar Area, Mach Patch	2	11786	90497	Dn%	\$30.30	13.81	28	0.54	-0.38	99.9	1.055	\$11,503	G1	S
Lamar Area, Mach Patch	2	11786	90497	Grad	\$30.30	13.81	7	2.30	0.90	74.1	0.963	(\$3,125)	G1	S
TOTALS & WTED MEANS		11786	90497	ITEM	\$30.30	13.81	NA	NA	NA	90.6	1.021	\$8,753	G1	S
C R200-057		11787	93626	a									A2	S
Pueblo Area, Mach Patch	2	11787	93626	AC%	\$32.70	10.24	11	0.18	-0.03	91.1	1.032	\$3,208	A2	S
Pueblo Area, Mach Patch	2	11787	93626	Dn%	\$32.70	10.24	21	0.79	-0.84	93.1	1.036	\$6,038	A2	S
Pueblo Area, Mach Patch	2	11787	93626	Grad	\$32.70	10.24	6	1.90	0.30	93.9	1.035	\$2,344	A2	S
TOTALS & WTED MEANS		11787	93626	ITEM	\$32.70	10.24	NA	NA	NA	92.7	1.035	\$11,591	A2	S
CR 200-059		11789	85577	a									A2	S
CO Spgs Area, Mach Patch	2	11789	85577	AC%	\$36.50	4.00	4	0.18	0.17	73.6	0.995	(\$201)	A2	S
CO Spgs Area, Mach Patch	2	11789	85577	Dn%	\$36.50	4.00	8	1.03	-1.49	68.4	0.919	(\$5,888)	A2	S
CO Spgs Area, Mach Patch	2	11789	85577	Grad	\$36.50	4.00	2	NA	0.50	NA	1.000	\$0	A2	S
TOTALS & WTED MEANS		11789	85577	ITEM	\$36.50	4.00	NA	NA	NA	70.4	0.958	(\$6,089)	A2	S
CR 200-059		11789	93626	a									A2	S
CO Spgs Area, Mach Patch	2	11789	93626	AC%	\$36.50	6.00	6	0.26	-0.10	72.5	0.962	(\$2,506)	A2	S
CO Spgs Area, Mach Patch	2	11789	93626	Dn%	\$36.50	6.00	12	1.05	-0.49	92.8	1.038	\$4,174	A2	S
CO Spgs Area, Mach Patch	2	11789	93626	Grad	\$36.50	6.00	3	3.50	-1.00	54.4	0.920	(\$3,518)	A2	S
TOTALS & WTED MEANS		11789	93626	ITEM	\$36.50	6.00				79.0	0.992	(\$1,850)	A2	S
CR 200-059		11789	85577A1	a									A2	S
CO Spgs Area, Mach Patch	2	11789	85577A1	AC%	\$36.50	6.85	9	0.21	-0.14	75.9	0.750	(\$32,568)	A2	S
CO Spgs Area, Mach Patch	2	11789	85577A1	Dn%	\$36.50	6.85	18	0.73	-0.14	99.8	0.750	(\$54,279)	A2	S
CO Spgs Area, Mach Patch	2	11789	85577A1	Grad	\$36.50	6.85	5	1.70	0.30	21.1	0.750	(\$12,507)	A2	S
TOTALS & WTED MEANS		11789	85577A1	ITEM	\$36.50	6.85	NA	NA	NA	76.9	0.750	(\$99,353)	A2	S

**TABLE 1
HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY PROJECT
AND MIX DESIGN FOR 1997 CONSTRUCTION SEASON USING QPM 97W**

PROJECT LOCATION	REG/ UNIT	SUBAC NUMBR	MIX DESIGN /PRCSS	ELE- MENT	BID \$/TON	TONS 1000	TEST "n"	PRCESS SD	MEAN -TC	QUAL LEVL	PAY FACT	Incent/ Disinc\$	Contr Code	HBP Agg
CR 200-059		11789	85577A2	a									A2	S
CO Spgs Area, Mach Patch	2	11789	85577A2	AC%	\$36.50	2.00			NA	NA	0.500	(\$10,950)	A2	S
CO Spgs Area, Mach Patch	2	11789	85577A2	Dn%	\$36.50	2.00			NA	NA	0.500	(\$18,250)	A2	S
CO Spgs Area, Mach Patch	2	11789	85577A2	Grad	\$36.50	2.00	1	>2V	NA	NA	0.500	(\$7,300)	A2	S
TOTALS & WTED MEANS		11789	85577A2	ITEM	\$36.50	2.00	NA	NA	NA	NA	0.500	(\$36,500)	A2	S
CR 200-059		11789	93626A	a									A2	S
CO Spgs Area, Mach Patch	2	11789	93626A	AC%	\$36.50	14.88	15	0.18	-0.09	88.0	1.012	\$2,030	A2	S
CO Spgs Area, Mach Patch	2	11789	93626A	Dn%	\$36.50	14.88	30	0.97	0.32	95.6	1.048	\$13,109	A2	S
CO Spgs Area, Mach Patch	2	11789	93626A	Grad	\$36.50	14.88	8	2.40	2.90	57.7	0.841	(\$17,242)	A2	S
TOTALS & WTED MEANS		11789	93626A	ITEM	\$36.50	14.88	NA	NA	NA	85.8	0.996	(\$2,103)	A2	S
FR(CX) 009-2 (009)		88041	841001	a									B5	C
3 Mi N of Silverthorne-N	1	88041	841001	AC%	\$42.00	1.73	2	NA	0.05	NA	1.000	\$0	B5	C
3 Mi N of Silverthorne-N	1	88041	841001	Dn%	\$42.00	1.73	4	0.88	-0.60	100.0	1.030	\$1,089	B5	C
3 Mi N of Silverthorne-N	1	88041	841001	Grad	\$42.00	1.73	1	NA	-4.00	NA	1.000	\$0	B5	C
TOTALS & WTED MEANS		88041	841001	ITEM	\$42.00	1.73	NA	NA	NA	100.0	1.015	\$1,089	B5	C
FR(CX) 009-2 (009)		88041	841002	a									B5	C
3 Mi N of Silverthorne-N	1	88041	841002	AC%	\$42.00	15.13	16	0.11	0.15	99.5	1.050	\$9,534	B5	C
3 Mi N of Silverthorne-N	1	88041	841002	Dn%	\$42.00	15.13	31	0.67	0.12	99.8	1.050	\$15,890	B5	C
3 Mi N of Silverthorne-N	1	88041	841002	Grad	\$42.00	15.13	8	1.40	-1.20	100.0	1.040	\$5,085	B5	C
TOTALS & WTED MEANS		88041	841002	ITEM	\$42.00	15.13	NA	NA	NA	99.8	1.048	\$30,508	B5	C
BRF 050-4 (17)		91067	93048	a									T1	C
SH 50 in Otero County	2	91067	93048	AC%	\$33.00	14.00	14	0.21	0.07	83.5	0.991	(\$1,249)	T1	C
SH 50 in Otero County	2	91067	93048	Dn%	\$33.00	14.00	28	0.59	-1.26	89.7	1.016	\$3,654	T1	C
SH 50 in Otero County	2	91067	93048	Grad	\$33.00	14.00	7	2.30	4.00	76.7	0.984	(\$1,495)	T1	C
TOTALS & WTED MEANS		91067	93048	ITEM	\$33.00	14.00	NA	NA	NA	85.2	1.002	\$911	T1	C

**TABLE 2
HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY PROJECT
AND MIX DESIGN FOR 1997 CONSTRUCTION SEASON USING QPM 97W**

PROJECT LOCATION	REG/ UNIT	SUBAC NUMBER	MIX DESIGN /FRCS	KLE- MENT	BID \$/TON	TONS 1000	TEST "n"	PROCESS		QUAL LEVL	PAY FACT	Incent/ Disinc\$	Contr Code	HBF Agg
								SD	MN-TC					
								Gradation is #8	Gradation is CONTROL					
STU M356-004	6	10391	R60072	AC%	\$35.00	3.50	3	0.14	0.07	100.0	1.025	\$919	B3	C
Parkdale - West	2	10934	109342	AC%	\$38.75	20.17	21	0.17	-0.03	91.8	1.029	\$6,684	A2	C
Parkdale - West	2	10934	109341	AC%	\$38.75	3.60	4	0.19	-0.06	92.4	1.030	\$1,254	A2	C
Six Miles S of SH 40	1	11233	88550	AC%	\$45.00	1.89	2	NA	-0.06	NA	1.000	\$0	A3	CX
US 6, Machine Patch	3	11338	81341	AC%	\$40.00	5.58	6	0.22	-0.00	86.3	1.024	\$1,613	E1	CX
I 25, Colo Blvd-South	6	11365	R6016	AC%	\$36.00	28.35	29	0.16	-0.02	93.8	1.037	\$11,404	K1	C
Tomaha Road North	1	11765	98203	AC%	\$36.16	33.38	34	0.14	0.13	89.0	1.003	\$1,198	S1	C
3 Mi N of Silverthorne-N	1	88041	841002	AC%	\$42.00	15.13	16	0.11	0.15	99.5	1.050	\$9,534	B5	C
3 Mi N of Silverthorne-N	1	88041	841001	AC%	\$42.00	1.73	2	NA	0.05	NA	1.000	\$0	B5	C
SH 50 in Otero County	2	91067	93048	AC%	\$33.00	14.00	14	0.21	0.07	83.5	0.991	(\$1,249)	T1	C
						127.32	131	0.16	0.05	91.49	1.021	\$31,357		
Eisenhower Tunnel-West	1	11350	98056	AC%	\$25.00	83.15	84	0.17	0.01	92.6	1.018	\$10,948	W2	S
Moffat Tunnel-Clear Creek	1	11628	97811	AC%	\$18.00	24.61	25	0.13	-0.05	97.3	1.050	\$6,644	E1	S
Copper Mountain-South	1	11706	603397	AC%	\$24.04	19.22	20	0.10	0.10	98.1	1.050	\$6,931	H1	S
Bridge Remov, CRI&P RR	1	11773	102007	AC%	\$58.10	3.77	8	0.12	0.11	95.0	1.040	\$2,628	K1	S
Bethune East	1	11779	68220	AC%	\$35.00	26.75	27	0.14	0.03	96.8	1.055	\$15,450	W2	S
Lamar Area, Mach Patch	2	11786	90497	AC%	\$30.30	13.81	14	0.21	-0.01	86.0	1.003	\$375	G1	S
Pueblo Area, Mach Patch	2	11787	93626	AC%	\$32.70	10.24	11	0.18	-0.03	91.1	1.032	\$3,208	A2	S
CO Spgs Area, Mach Patch	2	11789	85577A1	AC%	\$36.50	6.85	9	0.21	-0.14	75.9	0.750	(\$32,568)	A2	S
CO Spgs Area, Mach Patch	2	11789	85577A2	AC%	\$36.50	2.00	0	NA	NA	NA	0.500	(\$10,950)	A2	S
CO Spgs Area, Mach Patch	2	11789	93626A	AC%	\$36.50	14.88	15	0.18	-0.09	88.0	1.012	\$2,030	A2	S
CO Spgs Area, Mach Patch	2	11789	85577	AC%	\$36.50	4.00	4	0.18	0.17	73.6	0.995	(\$201)	A2	S
CO Spgs Area, Mach Patch	2	11789	93626	AC%	\$36.50	6.00	6	0.26	-0.10	72.5	0.962	(\$2,506)	A2	S
						215.28	223	0.16	0.00	91.10	1.013	\$1,991		
Gypsum-Eagle	3	10093	60128	AC%	\$24.85	5.03	5	0.20	-0.10	83.7	1.022	\$812	E1	StF
Gypsum-Eagle	3	10093	60128A	AC%	\$24.85	30.26	31	0.14	-0.06	95.6	1.048	\$10,805	E1	StF
						36.286	36	0.1487	-0.0646	\$3.904	1.04416	\$11,617		
All AC% Processes					\$31.09	377.89	390	0.15	0.0119	91.98	1.019	\$44,964		
					Wt'd Avg Absolute Mn-TC			0.0562						
120th and Huron	6	10391	R60072	Dn%	\$35.00	3.50	7	1.08	-0.41	94.3	1.035	\$2,144	B3	C
Parkdale - West	2	10934	109342	Dn%	\$38.75	20.17	41	0.88	-0.08	98.1	1.055	\$21,497	A2	C
Parkdale - West	2	10934	109341	Dn%	\$38.75	3.60	8	1.09	0.54	91.8	1.037	\$2,603	A2	C
Six Miles S of SH 40	1	11233	88550	Dn%	\$45.00	1.89	5	0.82	-0.72	97.4	1.030	\$1,276	A3	CX
US 6, Machine Patch	3	11338	81341	Dn%	\$40.00	5.58	12	1.15	-1.14	76.8	0.955	(\$5,020)	E1	CX
I 25, Colo Blvd-South	6	11365	R6016	Dn%	\$36.00	28.35	57	1.17	-0.66	86.4	0.974	(\$13,231)	K1	C
Tomaha Road North	1	11765	98203	Dn%	\$36.16	33.38	67	0.83	-0.49	96.6	1.050	\$30,050	S1	C
3 Mi N of Silverthorne-N	1	88041	841001	Dn%	\$42.00	1.73	4	0.88	-0.60	100.0	1.030	\$1,089	B5	C
3 Mi N of Silverthorne-N	1	88041	841002	Dn%	\$42.00	15.13	31	0.67	0.12	99.8	1.050	\$15,890	B5	C
SH 50 in Otero County	2	91067	93048	Dn%	\$33.00	14.00	28	0.59	-1.26	89.7	1.016	\$3,654	T1	C
						127.32	260	0.896	-0.313	93.2	1.025	\$59,952		
Eisenhower Tunnel-West	1	11350	98056	Dn%	\$25.00	83.15	167	1.03	0.27	94.1	1.025	\$25,804	W2	S
Moffat Tunnel-Clear Creek	1	11628	97811	Dn%	\$18.00	24.61	50	0.76	-0.46	98.0	1.055	\$12,181	E1	S
Copper Mountain-South	1	11706	603397	Dn%	\$24.04	19.22	39	0.89	-0.64	93.8	1.034	\$7,784	H1	S
Bridge Remov, CRI&P RR	1	11773	102007	Dn%	\$58.10	3.77	8	0.94	-0.58	94.8	1.040	\$4,381	K1	S
Bethune East	1	11779	68220	Dn%	\$35.00	26.75	54	1.00	-0.80	89.9	1.002	\$1,088	W2	S
Lamar Area, Mach Patch	2	11786	90497	Dn%	\$30.30	13.81	28	0.54	-0.38	99.9	1.055	\$11,503	G1	S
Pueblo Area, Mach Patch	2	11787	93626	Dn%	\$32.70	10.24	21	0.79	-0.84	93.1	1.036	\$6,038	A2	S
CO Spgs Area, Mach Patch	2	11789	85577	Dn%	\$36.50	4.00	8	1.03	-1.49	68.4	0.919	(\$5,888)	A2	S
CO Spgs Area, Mach Patch	2	11789	93626	Dn%	\$36.50	6.00	12	1.05	-0.49	92.8	1.038	\$4,174	A2	S
CO Spgs Area, Mach Patch	2	11789	85577A1	Dn%	\$36.50	6.85	18	0.73	-0.14	99.8	0.750	(\$54,279)	A2	S
CO Spgs Area, Mach Patch	2	11789	85577A2	Dn%	\$36.50	2.00	0	NA	NA	NA	0.500	(\$18,250)	A2	S
CO Spgs Area, Mach Patch	2	11789	93626A	Dn%	\$36.50	14.88	30	0.97	0.32	95.6	1.048	\$13,169	A2	S
						213.28	435	0.924	-0.205	94.1	1.015	\$7,645		
Gypsum-Eagle	3	10093	60128	Dn%	\$24.85	NA	0	NA	0.00	NA	1.000	\$0	E1	StF
Gypsum-Eagle	3	10093	60128A	Dn%	\$24.85	NA	0	NA	0.00	NA	1.000	\$0	E1	StF
All Dn% Processes					\$31.74	342.60	695	0.91	-0.307	93.765	1.019	\$67,597		
					Wt'd Avg Absolute Mn-TC			0.4884						

**TABLE 2
HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY PROJECT
AND MIX DESIGN FOR 1997 CONSTRUCTION SEASON USING QPM 97W**

PROJECT LOCATION	REG/ UNIT	SUBAC NUMBR	MIX DESIGN	ELE- MENT	BID \$/TON	TONS 1000	TEST "n"	PROCESS		QUAL LEVL	PAY FACT	Incent/ Disinc\$	Contr Code	HBF Agg	
								SD	MN-TC						
								Gradation is #6	Gradation is CONTROL						
120th and Huron	6	10391	R60072	Grad	\$35.00	3.50	2	NA	3.00	NA	1.000	\$0	B3	C	
Parkdale - West	2	10934	109341	Grad	\$38.75	3.60	2	NA	3.00	NA	1.000	\$0	A2	C	
Parkdale - West	2	10934	109342	Grad	\$38.75	20.17	11	3.00	6.20	92.5	1.040	\$6,244	A2	C	
Six Miles S of SH 40	1	11233	88550	Grad	\$45.00	1.69	2	NA	3.00	NA	1.000	\$0	A3	CX	
US 6, Machine Patch	3	11338	81341	Grad	\$40.00	5.58	3	2.50	2.70	66.7	0.987	(\$574)	E1	CX	
I 25, Colo Blvd-South	6	11365	R6016	Grad	\$36.00	28.35	15	1.80	-0.40	91.8	1.032	\$6,607	K1	C	
Tomaha Road North	1	11765	98203	Grad	\$36.16	33.38	17	3.30	-0.50	75.9	0.934	(\$16,008)	S1	C	
3 Mi N of Silverthorne-N	1	88041	841001	Grad	\$42.00	1.73	1	NA	-4.00	NA	1.000	\$0	B5	C	
3 Mi N of Silverthorne-N	1	88041	841002	Grad	\$42.00	15.13	8	1.40	-1.20	100.0	1.040	\$5,085	B5	C	
SH 50 in Otero County	2	91067	93048	Grad	\$33.00	14.00	7	2.30	4.00	76.7	0.984	(\$1,495)	T1	C	
						127.32	68	2.48	1.46	85.43	1.00	(\$141)			
Eisenhower Tunnel-West	1	11350	98056	Grad	\$25.00	83.15	42	2.30	0.30	90.5	1.010	\$4,230	W2	S	
Moffat Tunnel-Clear Creek	1	11628	97811	Grad	\$18.00	24.61	13	2.30	-0.10	93.2	1.039	\$3,482	E1	S	
Copper Mountain-South	1	11706	603397	Grad	\$24.04	19.22	10	2.10	2.70	54.7	0.801	(\$18,401)	H1	S	
Bridge Remov, CRI&P RR	1	11773	102007	Grad	\$58.10	3.77	4	1.30	-3.70	83.1	1.030	\$1,302	K1	S	
Bethune East	1	11779	68220	Grad	\$35.00	26.75	14	1.40	-0.60	86.5	1.006	\$1,090	W2	S	
Lamar Area, Mach Patch	2	11786	90497	Grad	\$30.30	13.81	7	2.30	0.90	74.1	0.963	(\$3,125)	G1	S	
Pueblo Area, Mach Patch	2	11787	93626	Grad	\$32.70	10.24	6	1.90	0.30	93.9	1.035	\$2,344	A2	S	
CO Spgs Area, Mach Patch	2	11789	85577	Grad	\$36.50	4.00	2	NA	0.50	NA	1.000	\$0	A2	S	
CO Spgs Area, Mach Patch	2	11789	93626	Grad	\$36.50	6.00	3	3.50	-1.00	54.4	0.920	(\$3,518)	A2	S	
CO Spgs Area, Mach Patch	2	11789	85577A	Grad	\$36.50	6.85	5	1.70	0.30	21.1	0.750	(\$12,507)	A2	S	
CO Spgs Area, Mach Patch	2	11789	85577A2	Grad	\$36.50	2.00	1	>2V	NA	NA	0.500	(\$7,300)	A2	S	
CO Spgs Area, Mach Patch	2	11789	93626A	Grad	\$36.50	14.88	8	2.40	2.90	57.7	0.841	(\$17,242)	A2	S	
						215.28	115	2.15	0.48	80.3	0.965	(\$49,644)			
Gypsum-Eagle	3	10093	60128	Grad	\$24.85	5.03	3	1.20	-0.70	71.5	1.007	\$168	E1	SIF	
Gypsum-Eagle	3	10093	60128A	Grad	\$24.85	30.25	16	0.80	-0.40	88.7	1.018	\$2,765	E1	SIF	
						35.286	19	0.857	-0.4428	86.249	1.01673	\$2,934			
All Grad Processes					\$31.09	377.89	202	2.13	0.676	82.556	0.981	(\$46,851)	0.68		
								W'd Avg Absolute Mn-TC		1.2499					
STU M356-004	6	10391	R60072	ITEM	\$35.00	3.50	NA	NA	NA	96.4	1.025	\$3,062	B3	C	
PLH 0503-047	2	10934	109341	ITEM	\$38.75	3.60	NA	NA	NA	92.0	1.028	\$3,857	A2	C	
PLH 0503-047	2	10934	109342	ITEM	\$38.75	20.17	NA	NA	NA	95.1	1.044	\$34,425	A2	C	
IM 0252-292	6	11365	R6016	ITEM	\$36.00	28.35	NA	NA	NA	89.7	1.005	\$4,780	K1	C	
IM 0252-303	1	11765	98203	ITEM	\$36.16	33.38	NA	NA	NA	90.2	1.013	\$15,241	S1	C	
FR(CX) 009-2 (009)	1	88041	841001	ITEM	\$42.00	1.73	NA	NA	NA	100.0	1.015	\$1,089	B5	C	
FR(CX) 009-2 (009)	1	88041	841002	ITEM	\$42.00	15.13	NA	NA	NA	99.8	1.048	\$30,508	B5	C	
BRF 050-4 (17)	2	91067	93048	ITEM	\$33.00	14.00	NA	NA	NA	85.2	1.002	\$911	T1	C	
Br 3851-010	1	11233	88550	ITEM	\$45.00	1.89	NA	NA	NA	97.4	1.015	\$1,276	A3	CX	
MC 006A 024	3	11338	81341	ITEM	\$40.00	5.56	NA	NA	NA	77.6	0.982	(\$3,981)	E1	CX	
						127.32	NA	NA	NA	91.4	3.968	\$156,878			
IM 0703-231	1	11350	98056	ITEM	\$25.00	83.15	NA	NA	NA	92.9	1.020	\$40,981	W2	S	
NH 0403-024	1	11628	97811	ITEM	\$18.00	24.61	NA	NA	NA	96.8	1.050	\$22,308	E1	S	
C 0911-003	1	11706	603397	ITEM	\$24.04	19.22	NA	NA	NA	87.3	0.992	(\$3,685)	H1	S	
NH 0243-053	1	11773	102007	ITEM	\$58.10	3.77	NA	NA	NA	92.5	1.038	\$8,312	K1	S	
IM 0705-067	1	11779	68220	ITEM	\$35.00	26.75	NA	NA	NA	91.3	1.019	\$17,627	W2	S	
C R200-056	2	11786	90497	ITEM	\$30.30	13.81	NA	NA	NA	90.6	1.021	\$8,753	G1	S	
C R200-057	2	11787	93626	ITEM	\$32.70	10.24	NA	NA	NA	92.7	1.035	\$11,591	A2	S	
CR 200-059	2	11789	85577	ITEM	\$36.50	4.00	NA	NA	NA	70.4	0.958	(\$6,089)	A2	S	
CR 200-059	2	11789	93626	ITEM	\$36.50	6.00	NA	NA	NA	79.0	0.992	(\$1,850)	A2	S	
CR 200-059	2	11789	85577A1	ITEM	\$36.50	6.85	NA	NA	NA	76.9	0.750	(\$99,353)	A2	S	
CR 200-059	2	11789	85577A2	ITEM	\$36.50	2.00	NA	NA	NA	NA	0.500	(\$36,500)	A2	S	
CR 200-059	2	11789	93626A	ITEM	\$36.50	14.88	NA	NA	NA	85.8	0.996	(\$2,103)	A2	S	
						215.28	NA	NA	NA	89.8	0.996	(\$40,008)			
HH 0702-193	3	10093	60128	ITEM	\$24.85	5.03	NA	NA	NA	78.8	1.016	\$981	E1	SIF	
HH 0702-193	3	10093	60128A	ITEM	\$24.85	30.26	NA	NA	NA	92.8	1.036	\$13,570	E1	SIF	
						35.286	NA	NA	NA	90.842	1.03319	\$14,551			
All ITEM (Composite) Processes					\$31.06	377.89	NA	NA	NA	90.919	1.015	\$65,710			

**TABLE 3
HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY PROJECT
AND MIX DESIGN FOR 1997 CONSTRUCTION SEASON USING QPM 97W**

PROJECT LOCATION	REG/ UNIT	SUBAC NUMBER	MIX DESIGN	ELC- MENT	BID \$/TON	TONS 1000	TEST "a"	PROCESS		QUAL LEVL	PAY FACT	Incent/ Disinc\$	Contr Code
			/PRCSS					SD	MM-TC	Gradation is #8	Gradation is CONTROLL		
FR(CX) 009-2 (009)	1	88041	841001	ITEM	\$42.00	1.73	NA	NA	NA	100.0	1.015	\$1,089	B5
FR(CX) 009-2 (009)	1	88041	841002	ITEM	\$42.00	15.13	NA	NA	NA	99.8	1.048	\$30,508	B5
Br 3851-010	1	11233	88550	ITEM	\$45.00	1.89	NA	NA	NA	97.4	1.015	\$1,276	A3
NH 0403-024	1	11628	97811	ITEM	\$18.00	24.61	NA	NA	NA	96.8	1.050	\$22,308	E1
STU M356-004	6	10391	R60072	ITEM	\$35.00	3.50	NA	NA	NA	96.4	1.025	\$3,062	B3
PLH 0503-047	2	10934	109342	ITEM	\$38.75	20.17	NA	NA	NA	95.1	1.044	\$34,425	A2
IM 0703-231	1	11350	98056	ITEM	\$25.00	83.15	NA	NA	NA	92.9	1.020	\$40,981	W2
HH 0702-193	3	10093	60128A	ITEM	\$24.85	30.26	NA	NA	NA	92.8	1.036	\$13,570	E1
C R200-057	2	11787	93626	ITEM	\$32.70	10.24	NA	NA	NA	92.7	1.035	\$11,591	A2
NH 0243-053		11773	102007	ITEM	\$58.10	3.77	NA	NA	NA	92.5	1.038	\$8,312	K1
PLH 0503-047	2	10934	109341	ITEM	\$38.75	3.60	NA	NA	NA	92.0	1.028	\$3,857	A2
IM 0705-067	1	11779	68220	ITEM	\$35.00	26.75	NA	NA	NA	91.3	1.019	\$17,627	W2
C R200-056	2	11786	90497	ITEM	\$30.30	13.81	NA	NA	NA	90.6	1.021	\$8,753	G1
IM 0252-303	1	11765	98203	ITEM	\$36.16	33.38	NA	NA	NA	90.2	1.013	\$15,241	S1
IM 0252-292	6	11365	R6016	ITEM	\$36.00	28.35	NA	NA	NA	89.7	1.005	\$4,780	K1
C 0911-003	1	11706	603397	ITEM	\$24.04	19.22	NA	NA	NA	87.3	0.992	(\$3,685)	H1
CR 200-059	2	11789	93626A	ITEM	\$36.50	14.88	NA	NA	NA	85.8	0.996	(\$2,103)	A2
BRF 050-4 (17)	2	91067	93048	ITEM	\$33.00	14.00	NA	NA	NA	85.2	1.002	\$911	T1
CR 200-059	2	11789	93626	ITEM	\$36.50	6.00	NA	NA	NA	79.0	0.992	(\$1,850)	A2
HH 0702-193	3	10093	60128	ITEM	\$24.85	5.03	NA	NA	NA	78.8	1.016	\$981	E1
MC 006A 024	3	11338	81341	ITEM	\$40.00	5.58	NA	NA	NA	77.6	0.982	(\$3,981)	E1
CR 200-059	2	11789	85577A	ITEM	\$36.50	6.85	NA	NA	NA	76.9	0.750	(\$99,353)	A2
CR 200-059	2	11789	85577	ITEM	\$36.50	4.00	NA	NA	NA	70.4	0.958	(\$6,089)	A2
CR 200-059	2	11789	85577A2	ITEM	\$36.50	2.00	NA	NA	NA	0.0	0.500	(\$36,500)	A2
377.89										90.919	1.01472	\$65,710	

**TABLE 3A
ITEM PROCESSES SORTED BY CONTRACTORS AND WEIGHTED AVERAGE QL**

FR(CX) 009-2 (009)	1	88041	841001	ITEM	\$42.00	1.73	NA	NA	NA	100.0	1.015	\$1,089	B5
FR(CX) 009-2 (009)	1	88041	841002	ITEM	\$42.00	15.13	NA	NA	NA	99.8	1.048	\$30,508	B5
16.86										99.8		B5	
Br 3851-010	1	11233	88550	ITEM	\$45.00	1.89	NA	NA	NA	97.4	1.015	\$1,276	A3
STU M356-004	6	10391	R60072	ITEM	\$35.00	3.50	NA	NA	NA	96.4	1.025	\$3,062	B3
IM 0703-231	1	11350	98056	ITEM	\$25.00	83.15	NA	NA	NA	92.9	1.020	\$40,981	W2
IM 0705-067	1	11779	68220	ITEM	\$35.00	26.75	NA	NA	NA	91.3	1.019	\$17,627	W2
109.90										92.5		W2	
HH 0702-193	3	10093	60128	ITEM	\$24.85	5.03	NA	NA	NA	78.8	1.016	\$981	E1
HH 0702-193	3	10093	60128A	ITEM	\$24.85	30.26	NA	NA	NA	92.8	1.036	\$13,570	E1
MC 006A 024	3	11338	81341	ITEM	\$40.00	5.58	NA	NA	NA	77.6	0.982	(\$3,981)	E1
NH 0403-024	1	11628	97811	ITEM	\$18.00	24.61	NA	NA	NA	96.8	1.050	\$22,308	E1
65.47										92.0		E1	
C R200-056	2	11786	90497	ITEM	\$30.30	13.81	NA	NA	NA	90.6	1.021	\$8,753	G1
IM 0252-303	1	11765	98203	ITEM	\$36.16	33.38	NA	NA	NA	90.2	1.013	\$15,241	S1
IM 0252-292	6	11365	R6016	ITEM	\$36.00	28.35	NA	NA	NA	89.7	1.005	\$4,780	K1
NH 0243-053	1	11773	102007	ITEM	\$58.10	3.77	NA	NA	NA	92.5	1.038	\$8,312	K1
32.12										90.0		K1	
PLH 0503-047	2	10934	109341	ITEM	\$38.75	3.60	NA	NA	NA	92.0	1.028	\$3,857	A2
PLH 0503-047	2	10934	109342	ITEM	\$38.75	20.17	NA	NA	NA	95.1	1.044	\$34,425	A2
C R200-057	2	11787	93626	ITEM	\$32.70	10.24	NA	NA	NA	92.7	1.035	\$11,591	A2
CR 200-059	2	11789	85577	ITEM	\$36.50	4.00	NA	NA	NA	70.4	0.958	(\$6,089)	A2
CR 200-059	2	11789	93626	ITEM	\$36.50	6.00	NA	NA	NA	79.0	0.992	(\$1,850)	A2
CR 200-059	2	11789	85577A1	ITEM	\$36.50	6.85	NA	NA	NA	76.9	0.750	(\$99,353)	A2
CR 200-059	2	11789	93626A	ITEM	\$36.50	14.88	NA	NA	NA	85.8	0.996	(\$2,103)	A2
CR 200-059	2	11789	85577A2	ITEM	\$36.50	2.00	NA	NA	NA	NA	0.500	(\$36,500)	A2
65.74										87.6		A2	
C 0911-003	1	11706	603397	ITEM	\$24.04	19.22	NA	NA	NA	87.3	0.992	(\$3,685)	H1
BRF 050-4 (17)	2	91067	93048	ITEM	\$33.00	14.00	NA	NA	NA	85.2	1.002	\$911	T1
377.89										90.9	1.01	\$65,710	

TABLE 4
HBP EVALUATION SUMMARIZED BY YEAR, 1991 HISTORICAL & 1992 - 1996 QC/QA

IDENTIFICATION YEAR	ELEMENT	TONS 1000s	TESTS "n"	STD DEV	MEAN - TARGET		QPM 2 QUAL LEV	QPM 1 PAY FACT	QPM 2 PAY FACT
					ABS	ALGEB			
Composites are element values weighted by "W" fa Element data are process averages weighted X tons. Gradation SD & Mean - Target									
1991	Asphalt %	2000	4027	0.18	0.07		87.0	1.005	1.000
Historical	Density %	900	1865	1.05	1.00		84.0	1.002	0.960
Elements	Gradation	2000	2317	2.59	1.82		85.7	1.005	0.989
Composite	Item	2000					85.2	1.004	0.978
1992	Asphalt %	282	214	0.14	0.06		96.3	1.039	1.042
QPM 1	Density %	282	570	1.00	0.71		88.9	1.018	0.990
Elements	Gradation	282	180	2.11	1.21		90.0	1.020	1.014
Composite	Item	282					91.3	1.025	1.010
1993	Asphalt %	482	837	0.15	0.04		93.2	1.032	1.028
QPM1	Density %	482	969	0.96	0.48		92.4	1.028	1.018
Elements	Gradation	482	309	2.31	1.53		88.8	1.016	1.010
Composite	Item	482					91.9	1.027	1.019
1994	Asphalt %	1496	1277	0.15	0.06	0.01	90.6	1.034	1.022
QPM1	Density %	1400	2812	0.96	0.57	-0.47	90.3	1.023	1.007
Elements	Gradation	1496	1053	2.05	1.12	-0.93	88.3	1.021	1.014
Composite	Item	1496					90.0	1.026	1.013
1995	Asphalt %	776	764	0.17	0.09	0.03	86.1	1.017	0.993
QPM1	Density %	757	1378	1.14	0.97	-0.85	81.1	0.999	0.950
Elements	Gradation	776	547	2.10	1.18	-0.18	88.9	1.017	1.015
Composite	Item	776					84.2	1.008	0.976
1991 - 1995	Asphalt %	3036	3092	0.15	0.07	0.02	90.4	1.030	1.017
Summary of	Density %	2921	5729	1.01	0.67	-0.60	88.1	1.017	0.992
QPM 1 Elements	Gradation	3036	2089	2.11	1.21	-0.67	88.7	1.019	1.014
SUMMARY QPM1 COMPOSITES		3036					88.9	1.021	1.004
1995	Asphalt %	328	342	0.18	0.05	0.02	88.7	1.014	1.000
QPM 2	Density %	314	625	0.99	0.46	-0.38	91.7	1.023	1.017
Elements	Gradation	328	191	2.76	1.19	0.55	85.1	1.003	0.990
Composite	Item	328					89.5	1.016	1.007
1996	Asphalt %	830	847	0.16	0.07	0.02	89.8	NA	1.008
QPM 2	Density %	830	1465	0.91	0.60	-0.56	91.9	NA	1.015
Elements	Gradation	830	438	1.98	1.53	0.15	89.6	NA	1.012
Composite	Item	830					90.8	NA	1.012
1997	Asphalt %	378	390	0.15	0.57	0.01	92.0	NA	1.019
QPM 2	Density %	343	695	0.91	0.49	-0.31	93.8	NA	1.019
Elements	Gradation	378	202	2.13	1.30	0.68	82.6	NA	1.015
Composite	Item	378					91.0	NA	1.018
1995 - 1997	Asphalt %	1536	1579	0.16	0.19	0.02	90.1	NA	1.009
Summary of	Density %	1487	2785	0.93	0.54	-0.46	92.3	NA	1.016
QPM 2 Elements	Gradation	1536	831	2.18	1.40	0.36	86.9	NA	1.008
SUMMARY QPM2 COMPOSITES		1536					90.6	NA	1.012
SUMMARY QC/QA PROJECTS		4572					89.5	NA	1.007

TABLE 5

QC/QA HBP EVALUATION, SUMMARY BY ELEMENT AND YEARLY COMPOSITES
1992 - 1996 Average Values (Weighted by Tons) Related to 1991 Historical

Year & Identity	Element or Composite	Standard Deviation		Avg Abs Mean-Tol Lim		QPM 2 Quality Level		QPM 2 Pay Factor	
		Value	% of '91	Value	% of '91	Value	% of '91	Value	% of '91
'91 Historical	Asphalt %	0.18	100.0	0.23	100.0	87.0	100.0	1.000	100.0
'92 QPM1	Asphalt %	0.14	77.8	0.24	104.3	96.3	110.7	1.042	104.2
'93 QPM1	Asphalt %	0.15	83.3	0.26	113.0	93.2	107.1	1.028	102.8
'94 QPM1	Asphalt %	0.15	83.3	0.24	106.1	90.6	104.1	1.022	102.2
'95 QPM1	Asphalt %	0.17	96.1	0.21	90.0	86.1	99.0	0.993	99.3
All QPM1	Asphalt %	0.15	86.1	0.24	102.9	90.40	103.9	1.017	101.7
'95 QPM2	Asphalt %	0.18	99.4	0.25	107.0	88.6	101.8	1.000	100.0
'96 QPM2	Asphalt %	0.16	91.1	0.23	100.0	89.8	103.2	1.008	100.8
'97 QPM2	Asphalt %	0.15	83.3	0.24	105.8	92.0	105.7	1.019	101.9
All QPM2	Asphalt %	0.16	91.1	0.24	102.9	90.05	103.5	1.009	100.9
Based on the NO. 8 Sieve									
'91 Hist.	Density %	1.05	100.0	1.00	100.0	84.0	100.0	0.960	100.0
'92 QPM1	Density %	1.00	95.2	1.29	129.0	88.9	105.8	0.990	103.1
'93 QPM1	Density %	0.96	91.4	1.52	152.0	92.4	110.0	1.018	106.0
'94 QPM1	Density %	0.96	91.4	1.43	143.0	90.3	107.5	1.007	104.9
'95 QPM1	Density %	1.14	108.9	1.03	102.8	81.1	96.5	0.949	98.9
All QPM1	Density %	1.01	96.2	1.33	132.9	88.17	105.0	0.992	103.4
'95 QPM2	Density %	0.99	94.3	1.54	153.6	91.7	109.2	1.017	105.9
'96 QPM2	Density %	0.91	86.8	1.40	140.1	91.9	109.5	1.015	105.7
'97 QPM2	Density %	0.91	86.7	1.51	151.2	93.8	111.6	1.019	106.1
All QPM2	Density %	0.93	88.4	1.46	145.5	92.29	109.9	1.016	105.9
Based on Gradation (QPM Controlling Sieve)									
'91 Hist.	Gradation	2.59	100.0	3.18	100.0	85.7	100.0	0.989	100.0
'92 QPM1	Gradation	2.11	81.5	3.79	119.2	90.0	105.0	1.014	102.5
'93 QPM1	Gradation	2.31	89.2	3.47	109.1	88.8	103.6	1.010	102.1
'94 QPM1	Gradation	2.05	79.2	3.88	122.0	88.3	103.0	1.014	102.5
'95 QPM1	Gradation	2.10	81.1	3.84	120.6	88.9	103.7	1.016	102.8
All QPM1	Gradation	2.11	81.5	3.80	119.3	88.69	103.5	1.014	102.5
'95 QPM2	Gradation	2.76	106.6	3.81	119.7	85.1	99.3	0.990	100.1
'96 QPM2	Gradation	1.98	76.6	3.47	109.0	89.6	104.5	1.012	102.3
'97 QPM2	Gradation	2.13	82.2	3.70	116.3	82.6	96.3	0.981	99.2
All QPM2	Gradation	2.19	84.6	3.59	112.8	87.37	101.9	1.002	101.3
Values Below Are Composites of Above Values, i.e., Elements Weighted by "W" Factors									
'91 Hist.	Composite	--	100.0	--	100.0	85.2	100.0	0.978	100.0
'92 QPM1	Composite	--	87.2	--	119.6	91.3	107.1	1.010	103.3
'93 QPM1	Composite	--	88.6	--	131.7	91.9	107.9	1.019	104.3
'94 QPM1	Composite	--	86.5	--	127.7	90.0	105.6	1.013	103.6
'95 QPM1	Composite	--	99.5	--	102.5	84.2	98.7	0.976	99.8
All QPM1	Composite	--	90.2	--	121.2	88.9	104.4	1.004	102.7
'95 QPM2	Composite	--	98.3	--	132.8	89.5	105.0	1.007	103.0
'96 QPM2	Composite	--	86.0	--	121.9	90.8	106.6	1.012	103.6
'97 QPM2	Composite	--	84.8	--	130.6	91.0	106.8	1.015	103.5
All QPM2	Composite	--	88.4	--	126.2	90.6	106.4	1.011	103.5
All QC&QA	Composite	--	89.6	--	122.9	89.5	105.0	1.007	103.0

**TABLE 6
HBP QC/QA SUMMARY BY CONTRACTORS FOR 1992 TO 1997, QUALITY LEVEL AND PERCENT RED**

Sorted By Quality Level For Each Block Of Contractors Based on Weighted Average -ALL

CONTR	1992 QPM 1		1994 QPM 1		1995 QPM 1		WT'G AVG-1		1995 QPM 2		1996 QPM 2		1997 QPM 2		WT'G AVG-2		WT'G AVG-all		TONS UNDER QPM 1				TONS UNDER QPM 2				TOTAL TONS						
	QL	RD %	QL	RD %	QL	RD %	QL	RD %	QL	RD %	QL	RD %	QL	RD %	QL	RD %	QL	RD %	92-93	94-1	95-1	92-95-1	95-2	96-2	97-2	95-97-2	92-97	%Tot					
W2	92.2	3.7	93.7	0.6	88.8	10.2	92.3	3.4	87.9	6.6	93.2	2.1	92.6	0.5	92.8	1.9	92.5	2.7	279.0	147.7	47.7	474.4	18.5	253.6	109.9	382.0	856.4	18.7					
E1	0.0	0.0	91.7	1.5	0.0	0.0	91.7	1.5	92.6	0.9	95.8	0.0	92.0	0.5	93.0	0.5	92.2	1.1	0.0	190.3	0.0	190.3	29.2	28.5	65.5	123.2	313.5	6.9					
H1	99.4	0.2	94.8	0.2	86.2	4.3	91.7	2.0	88.9	2.1	94.5	0.3	87.3	12.8	92.6	2.2	92.1	2.1	28.0	69.2	77.0	174.2	23.5	101.8	18.2	144.6	318.7	7.0					
C4	89.3	8.0	93.4	1.7	83.4	9.6	91.3	3.7	91.6	1.1	92.9	0.0	0.0	0.0	91.9	0.9	91.5	3.1	55.0	327.6	70.4	453.0	83.6	24.0	0.0	107.6	560.6	12.3					
A1	94.4	0.2	92.5	2.5	85.7	9.8	92.3	2.6	87.2	4.5	92.9	1.8	0.0	0.0	88.4	4.0	91.1	3.0	179.0	39.0	59.9	277.9	88.2	22.4	0.0	110.6	388.5	8.5					
B1	92.2	6.9	92.4	1.0	85.2	8.9	90.7	4.0	96.7	0.2	85.1	3.7	0.0	0.0	87.3	3.0	89.1	3.5	26.0	78.8	31.5	136.1	20.8	91.2	0.0	112.0	248.1	5.4					
A2	70.5	25.0	73.4	13.6	0.0	0.0	72.5	17.0	83.3	6.5	80.0	6.2	87.6	8.0	84.1	7.1	79.5	11.1	30.0	70.1	0.0	100.1	31.8	50.2	67.7	149.7	249.8	5.5					
>5% of Total	91.8	4.1	91.6	2.2	85.7	8.2	90.7	3.8	89.4	3.0	91.1	2.2	90.7	3.3	90.6	2.7	90.7	3.3	597.0	922.5	286.5	1806.0	295.6	571.7	262.3	1129.6	2935.6	64.2					
	% of Total Tons																		13.1	20.2	6.3	39.5	6.5	12.5	5.7	24.7	64.2						
R1	0.0	0.0	92.3	4.3	90.2	12.1	91.6	6.9	0.0	0.0	95.5	2.2	0.0	0.0	95.5	2.2	93.2	4.9	0.0	48.5	24.0	72.5	0.0	61.3	0.0	61.3	123.8	2.7					
C1	92.3	0.2	93.8	0.7	0.0	0.0	93.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.2	0.5	52.0	80.0	0.0	132.0	0.0	0.0	0.0	0.0	132.0	2.9					
B4	89.0	2.9	0.0	0.0	91.5	4.5	90.3	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.3	3.7	25.0	0.0	27.7	52.7	0.0	0.0	0.0	0.0	52.7	1.2					
S1	88.6	8.2	90.2	2.4	0.0	0.0	89.6	4.5	0.0	0.0	93.7	0.0	90.2	3.9	91.0	3.0	90.1	4.0	28.0	49.5	0.0	77.5	0.0	9.3	33.4	42.7	120.2	2.6					
C3	0.0	0.0	90.9	1.6	82.8	0.0	90.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0	1.4	0.0	53.1	6.5	59.6	0.0	0.0	0.0	0.0	59.6	1.3					
K1	88.4	0.2	94.5	2.6	89.8	6.8	90.8	2.6	93.8	0.2	84.1	2.3	90.2	0.0	87.6	1.3	89.0	1.9	39.0	30.6	22.1	91.7	20.9	61.9	32.1	114.9	206.6	4.5					
G1	0.0	0.0	90.2	4.5	88.2	1.8	88.5	2.2	0.0	0.0	94.8	0.0	90.6	0.0	91.3	0.0	88.9	1.9	0.0	17.8	90.7	108.5	0.0	3.0	13.8	16.8	125.3	2.7					
P1	0.0	0.0	89.8	3.2	85.6	11.4	88.2	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88.2	6.4	0.0	114.3	72.3	186.6	0.0	0.0	0.0	0.0	186.6	4.1					
B2	0.0	0.0	86.0	6.9	94.1	0.2	86.7	6.3	0.0	0.0	96.3	0.0	0.0	0.0	96.3	0.0	87.9	5.5	0.0	82.5	7.8	90.3	0.0	13.3	0.0	13.3	103.6	2.3					
U1	0.0	0.0	0.0	0.0	86.7	7.4	86.7	7.4	0.0	0.0	91.2	1.6	0.0	0.0	91.2	1.6	87.8	6.0	0.0	0.0	57.3	57.3	0.0	18.8	0.0	18.8	75.9	1.7					
C2	0.0	0.0	82.0	8.2	0.0	0.0	82.0	8.2	0.0	0.0	91.6	1.2	0.0	0.0	91.6	1.2	86.5	4.9	0.0	28.8	0.0	28.8	0.0	25.0	0.0	25.0	53.8	1.2					
W1	0.0	0.0	81.8	16.1	91.3	2.6	85.9	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.9	10.3	0.0	38.2	28.5	66.7	0.0	0.0	0.0	0.0	66.7	1.5					
N1	0.0	0.0	0.0	0.0	69.9	28.6	69.9	28.6	0.0	0.0	88.8	0.8	0.0	0.0	88.8	0.8	77.5	17.3	0.0	0.0	55.3	55.3	0.0	37.6	0.0	37.6	92.9	2.0					
B3	0.0	0.0	66.3	38.0	85.6	28.8	72.7	34.9	87.0	7.5	0.0	0.0	96.4	0.0	89.2	5.8	76.8	27.7	0.0	30.5	15.3	45.8	11.5	0.0	3.5	15.0	60.8	1.3					
A4	0.0	0.0	0.0	0.0	61.9	13.8	61.9	13.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.9	13.8	0.0	0.0	66.0	66.0	0.0	0.0	0.0	0.0	66.0	1.4					
<6 %, >1%	90.0	2.2	88.2	6.2	82.3	10.5	86.1	7.5	91.4	2.8	90.3	1.6	90.5	1.6	90.5	1.7	87.1	5.2	144.0	573.8	473.5	1191.3	32.4	220.0	82.8	335.2	1526.5	33.4					
	% of Total Tons																		3.1	12.6	10.4	26.1	0.7	4.8	1.8	7.9	33.4						
B5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.8	0.0	99.8	0.0	99.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.9	16.9	16.9	0.4					
A3	0.0	0.0	0.0	0.0	91.4	0.2	91.4	0.2	0.0	0.0	0.0	0.0	97.4	0.0	97.4	0.0	92.7	0.2	0.0	0.0	6.9	6.9	0.0	0.0	1.9	1.9	8.8	0.2					
D1	91.3	7.0	0.0	0.0	0.0	0.0	91.3	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.3	7.0	23.0	0.0	0.0	23.0	0.0	0.0	0.0	0.0	23.0	0.5					
H2	0.0	0.0	0.0	0.0	88.8	0.2	88.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88.8	0.2	0.0	0.0	8.8	8.8	0.0	0.0	0.0	0.0	8.8	0.2					
T1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.2	0.0	85.2	0.0	85.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0	14.0	14.0	0.3					
K2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.7	5.4	0.0	0.0	83.7	5.4	83.7	5.4	0.0	0.0	0.0	0.0	0.0	37.9	0.0	37.9	37.9	0.8					
<1% of Total	91.3	7.0	0.0	0.0	89.9	0.2	90.7	4.2	0.0	0.0	83.7	5.4	93.4	0.0	88.2	2.9	89.1	3.4	23.0	0.0	15.7	38.7	0.0	37.9	32.8	70.7	109.4	2.4					
	% of Total Tons																		0.5	0.0	0.3	0.8	0.0	0.8	0.7	1.5	2.4						
All 28 Contractors	91.5	3.8	90.3	3.8	83.7	9.5	88.9	5.2	89.6	3.0	90.5	2.2	90.9	2.7	90.6	2.5	89.4	4.2	764.0	1496	775.7	3036.0	328.0	829.6	377.9	1535.5	4571.5	100					
	% of Total Tons																		16.7	32.7	17.0	66.4	7.2	18.1	8.3	33.6	100.0						

Note: The Table is divided into three categories, (1) contractors producing 6% or more of total QC/QA tons, (2) those producing less than 6% and more than 1%, and (3) those producing less than 1%.

**TABLE 6A
ABBREVIATED HBP QC/QA SUMMARY BY CONTRACTORS
FOR 1992 TO 1997 QUALITY LEVEL AND PERCENT RED**

CONTR CODE	AVG ALL QPM 1		AVG ALL QPM 2		AVG ALL QC/QA		TONS BY QPM 1 or 2		ALL QC/QA	
	QL	RD %	QL	RD %	QL	RD %	All QPM 1	All QPM 2	TONS	% Tot
W2	92.3	3.4	92.8	1.9	92.5	2.7	474.4	382.0	856.4	18.7
E1	91.7	1.5	93.0	0.5	92.2	1.1	190.3	123.2	313.5	6.9
H1	91.7	2.0	92.6	2.2	92.1	2.1	174.2	144.5	318.7	7.0
C4	91.3	3.7	91.9	0.9	91.5	3.1	453.0	107.6	560.6	12.3
A1	92.3	2.6	88.4	4.0	91.1	3.0	277.9	110.6	388.5	8.5
B1	90.7	4.0	87.3	3.0	89.1	3.5	136.1	112.0	248.1	5.4
A2	72.5	17.0	84.1	7.1	79.5	11.1	100.1	149.7	249.8	5.5
>5% of	90.7	3.8	90.6	2.7	90.7	3.3	1806.0	1129.6	2935.6	64.2
Total					% of Total Tons		39.5	24.7	64.2	
R1	91.6	6.9	95.5	2.2	93.2	4.9	72.5	51.3	123.8	2.7
C1	93.2	0.5	0.0	0.0	93.2	0.5	132.0	0.0	132.0	2.9
B4	90.3	3.7	0.0	0.0	90.3	3.7	52.7	0.0	52.7	1.2
S1	89.6	4.5	91.0	3.0	90.1	4.0	77.5	42.7	120.2	2.6
C3	90.0	1.4	0.0	0.0	90.0	1.4	59.6	0.0	59.6	1.3
K1	90.8	2.6	87.6	1.3	89.0	1.9	91.7	114.9	206.6	4.5
G1	88.5	2.2	91.3	0.0	88.9	1.9	108.5	16.8	125.3	2.7
P1	88.2	6.4	0.0	0.0	88.2	6.4	186.6	0.0	186.6	4.1
B2	86.7	6.3	96.3	0.0	87.9	5.5	90.3	13.3	103.6	2.3
U1	86.7	7.4	91.2	1.6	87.8	6.0	57.3	18.6	75.9	1.7
C2	82.0	8.2	91.6	1.2	86.5	4.9	28.8	25.0	53.8	1.2
W1	85.9	10.3	0.0	0.0	85.9	10.3	66.7	0.0	66.7	1.5
N1	69.9	28.6	88.8	0.8	77.5	17.3	55.3	37.6	92.9	2.0
B3	72.7	34.9	89.2	5.8	76.8	27.7	45.8	15.0	60.8	1.3
A4	61.9	13.8	0.0	0.0	61.9	13.8	66.0	0.0	66.0	1.4
<5%, >1%	86.1	7.5	90.5	1.7	87.1	6.2	1191.3	335.2	1526.5	33.4
Total					% of Total Tons		26.1	7.3	33.4	
B5	0.0	0.0	99.8	0.0	99.8	0.0	0.0	16.9	16.9	0.4
A3	91.4	0.2	97.4	0.0	92.7	0.2	6.9	1.9	8.8	0.2
D1	91.3	7.0	0.0	0.0	91.3	7.0	23.0	0.0	23.0	0.5
H2	88.8	0.2	0.0	0.0	88.8	0.2	8.8	0.0	8.8	0.2
T1	0.0	0.0	85.2	0.0	85.2	0.0	0.0	14.0	14.0	0.3
K2	0.0	0.0	83.7	5.4	83.7	5.4	0.0	37.9	37.9	0.8
<1% of	90.7	4.2	88.2	2.9	89.1	3.4	38.7	70.7	109.4	2.4
Total					% of Total Tons		0.8	1.5	2.4	
All 28 Contractors	88.9	5.2	90.6	2.5	89.4	4.2	3036.0	1535.5	4571.5	100.0
Total					% of Total Tons		66.4	33.6	100.0	

Notes: All Averages are weighted by tons. The Table is divided into three categories, (1) contractors producing 5% or more of total QC/QA tons, (2) those producing less than 5% and more than 1%, and (3) those producing less than 1%.

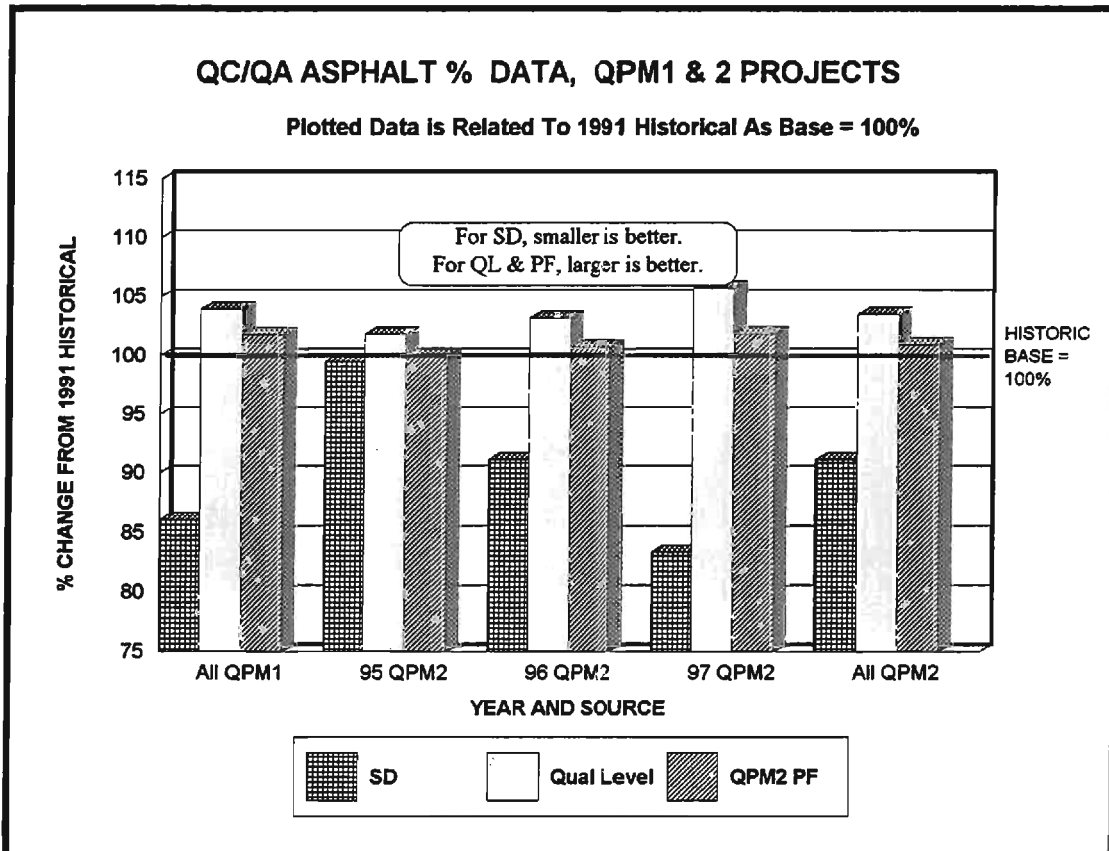


Figure 1

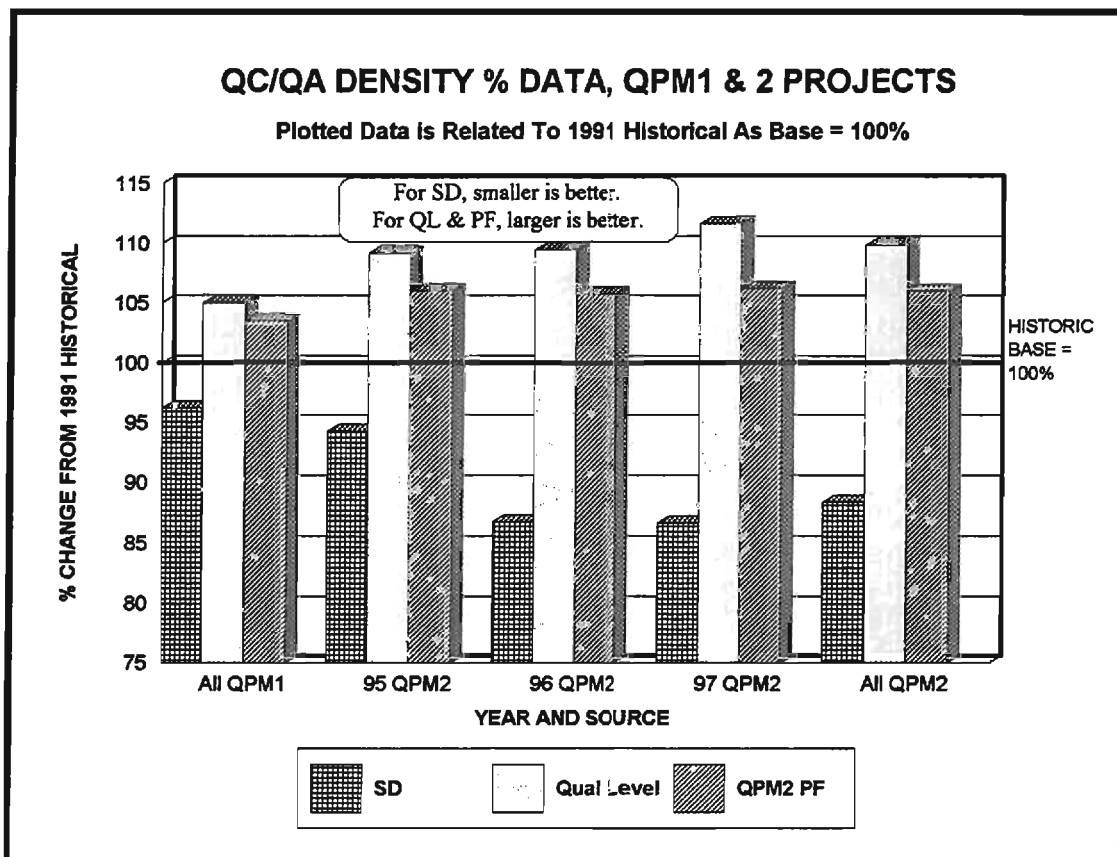


Figure 2

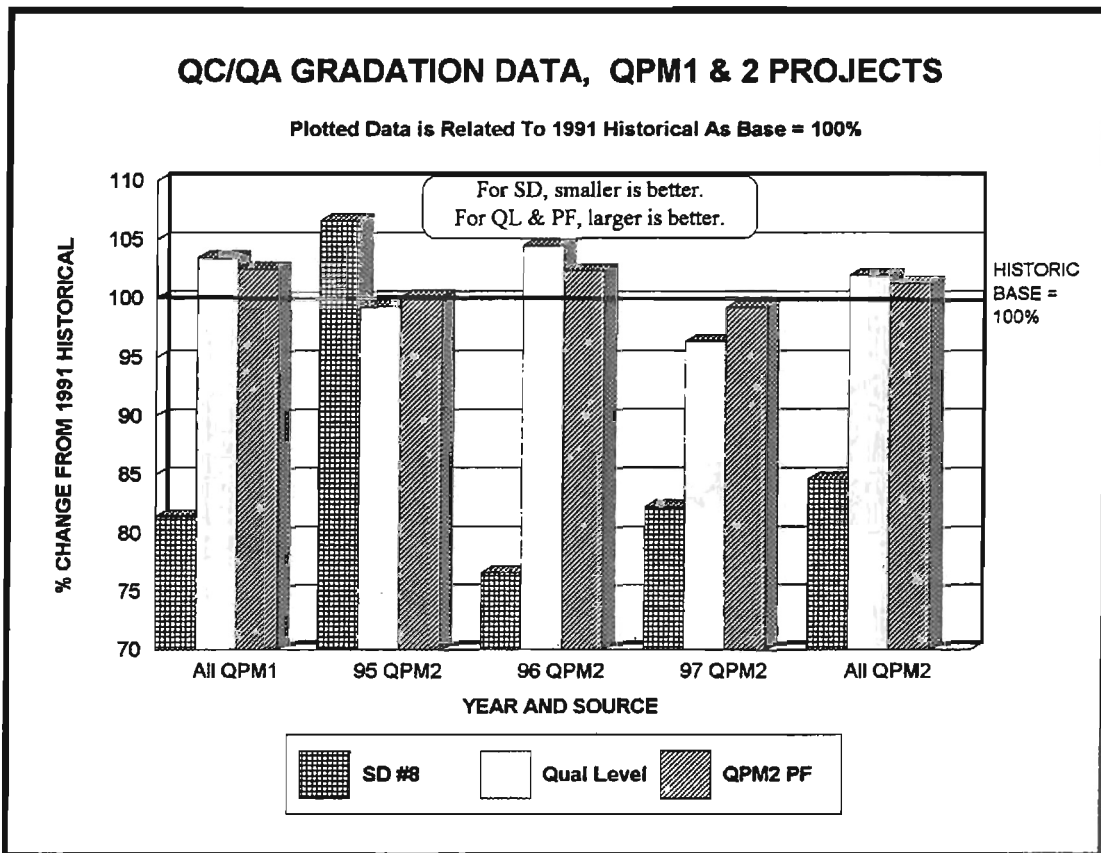


Figure 3

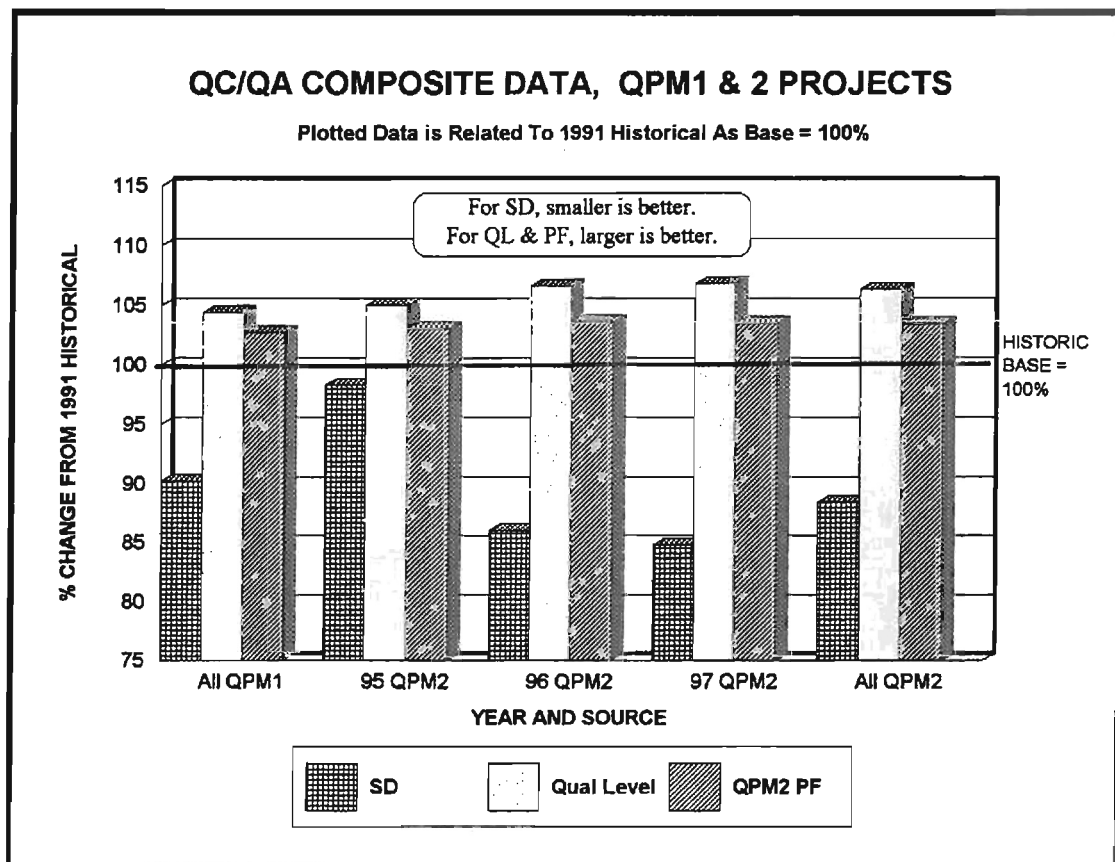


Figure 4

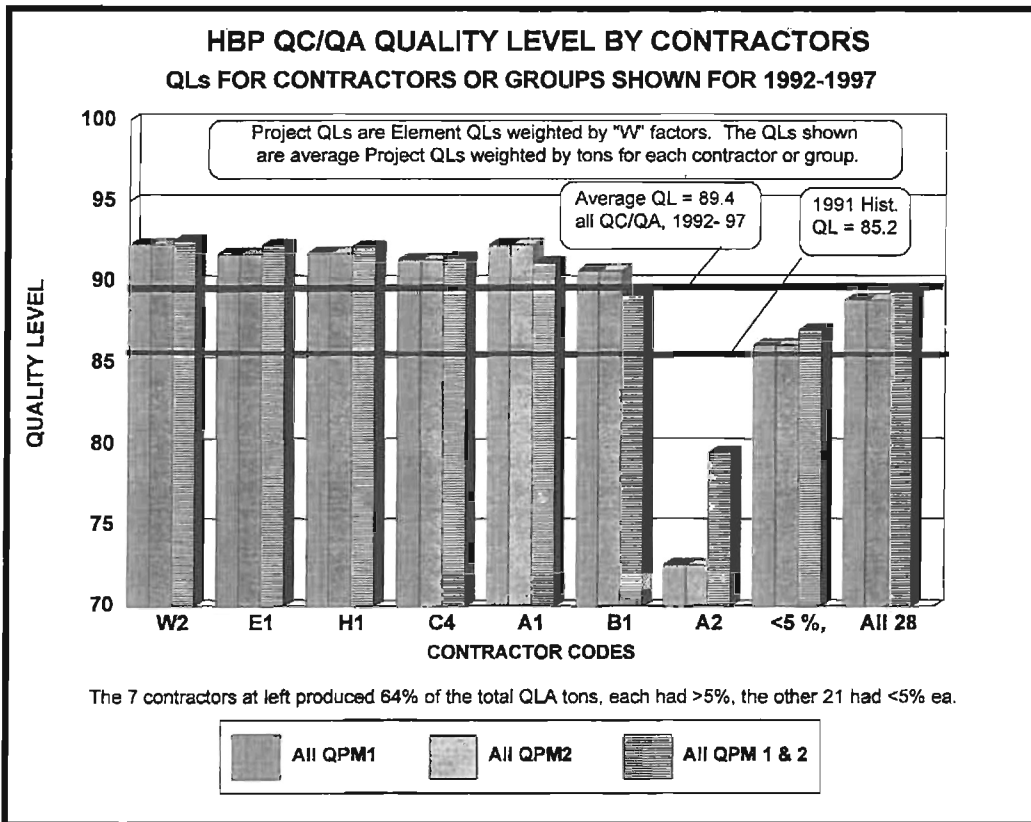


Figure 5

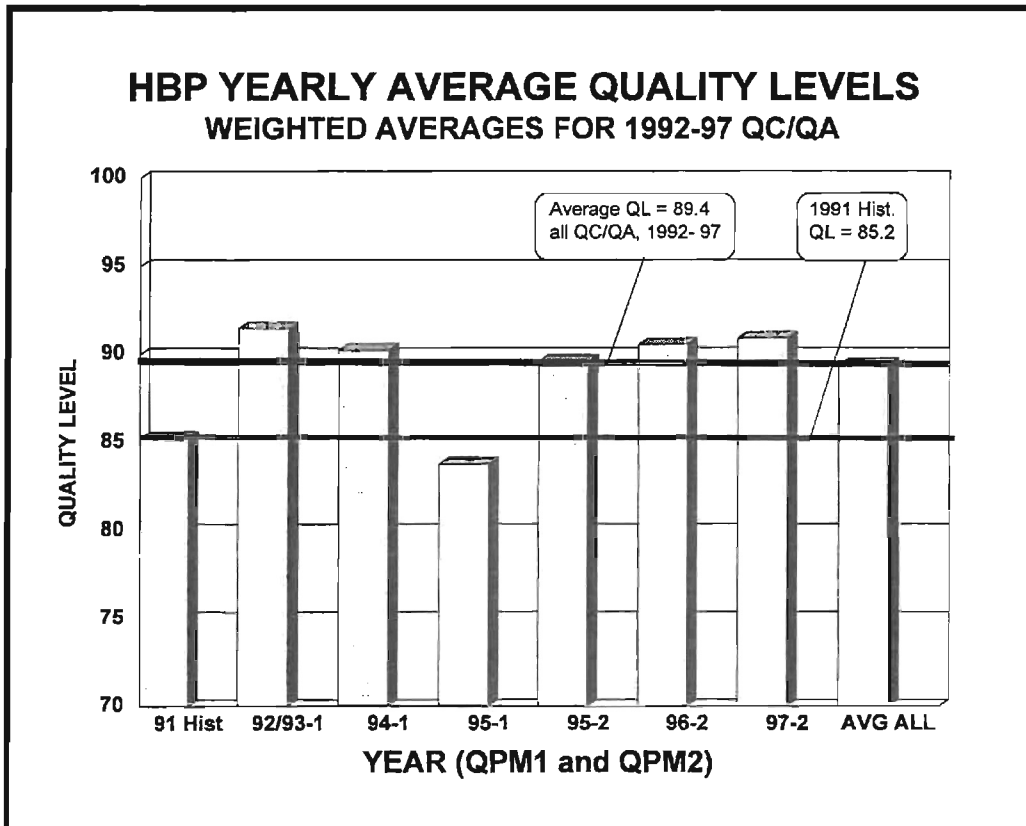


Figure 6

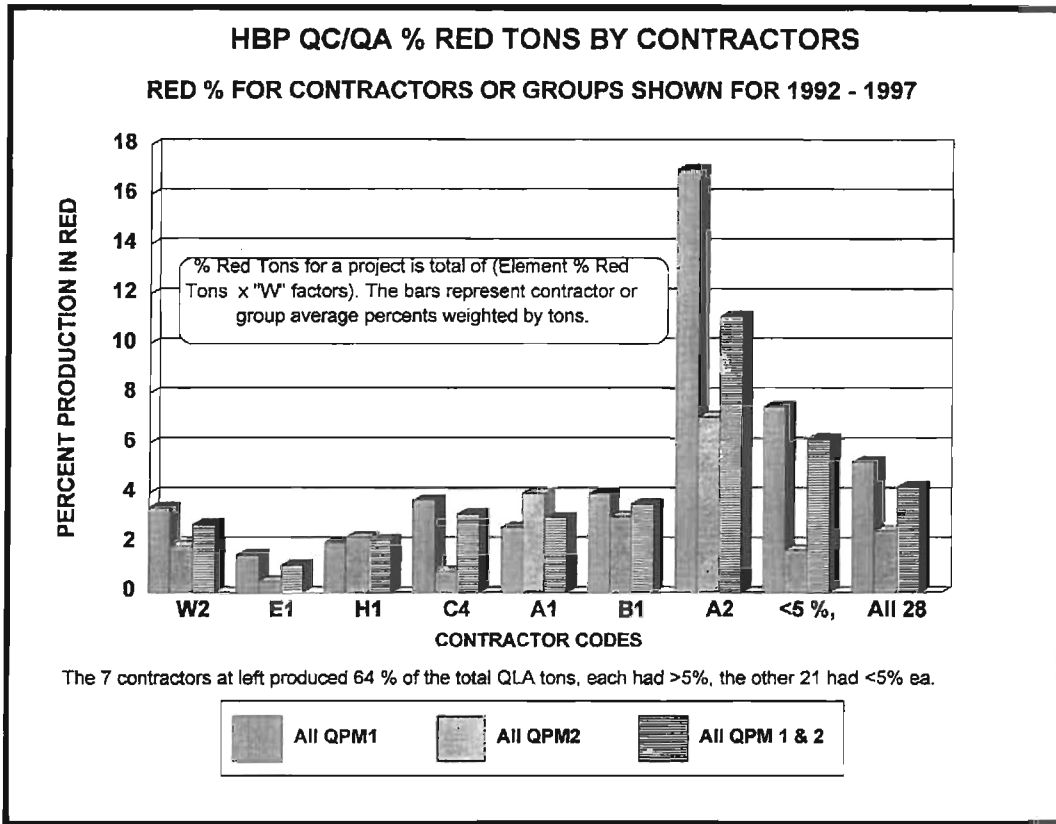


Figure 7

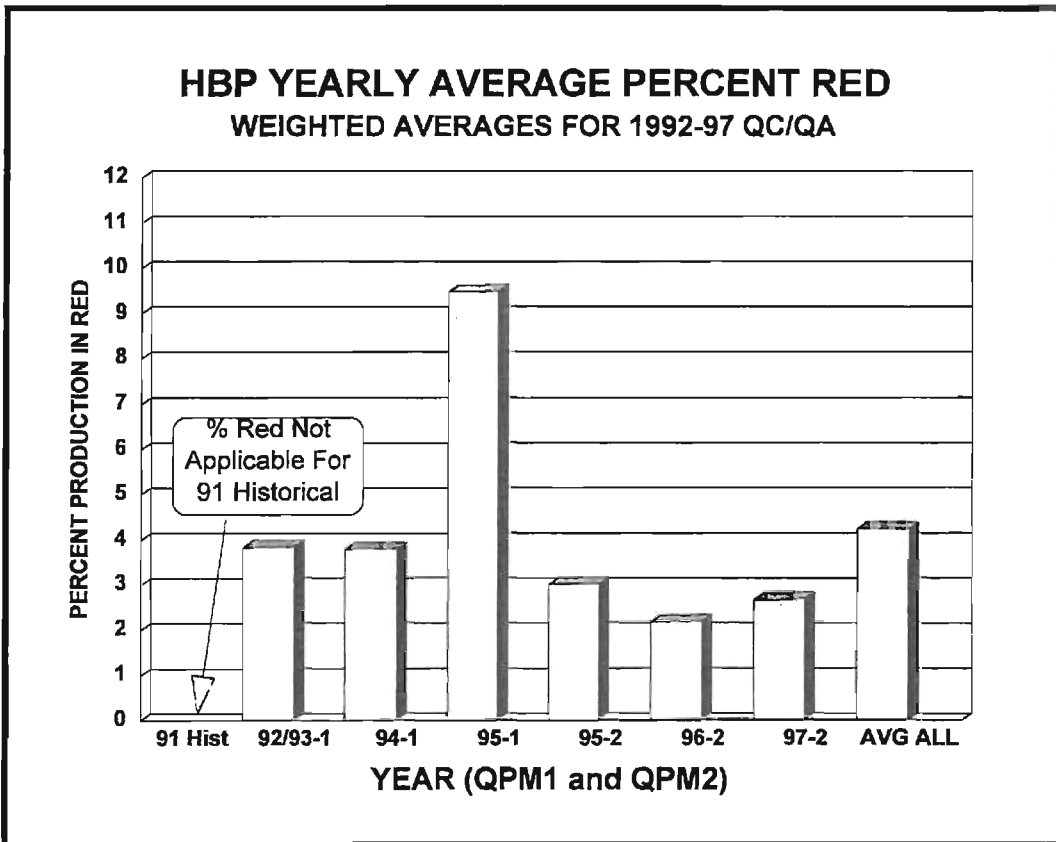


Figure 8

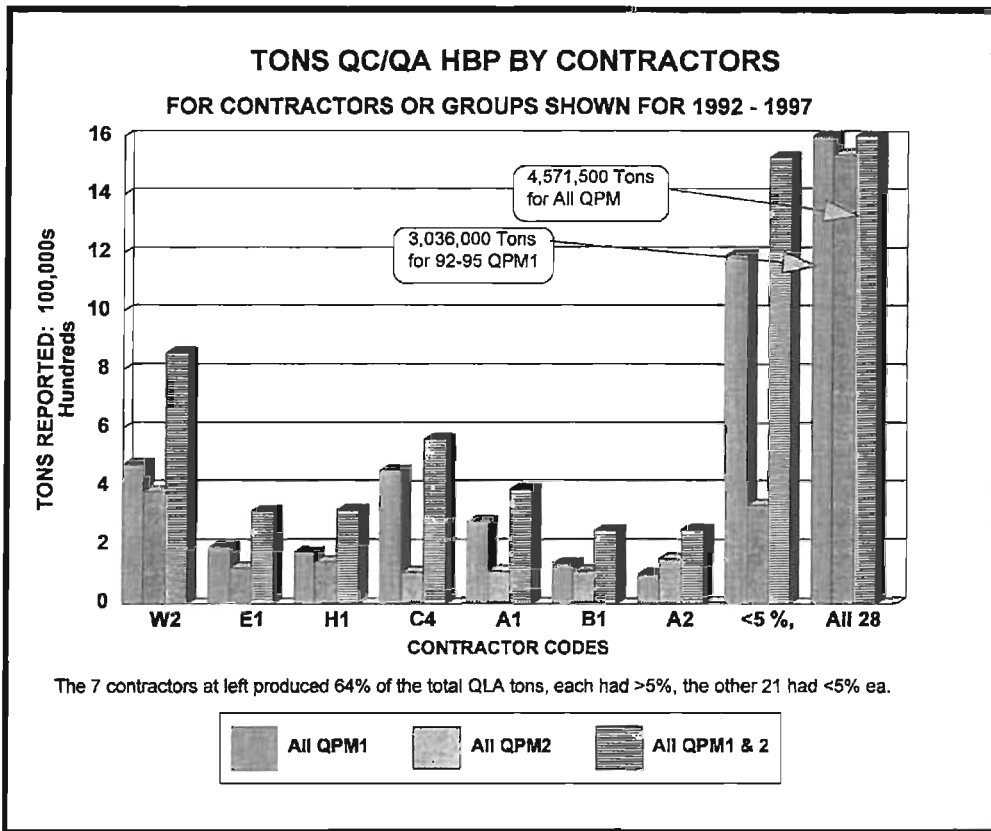


Figure 9

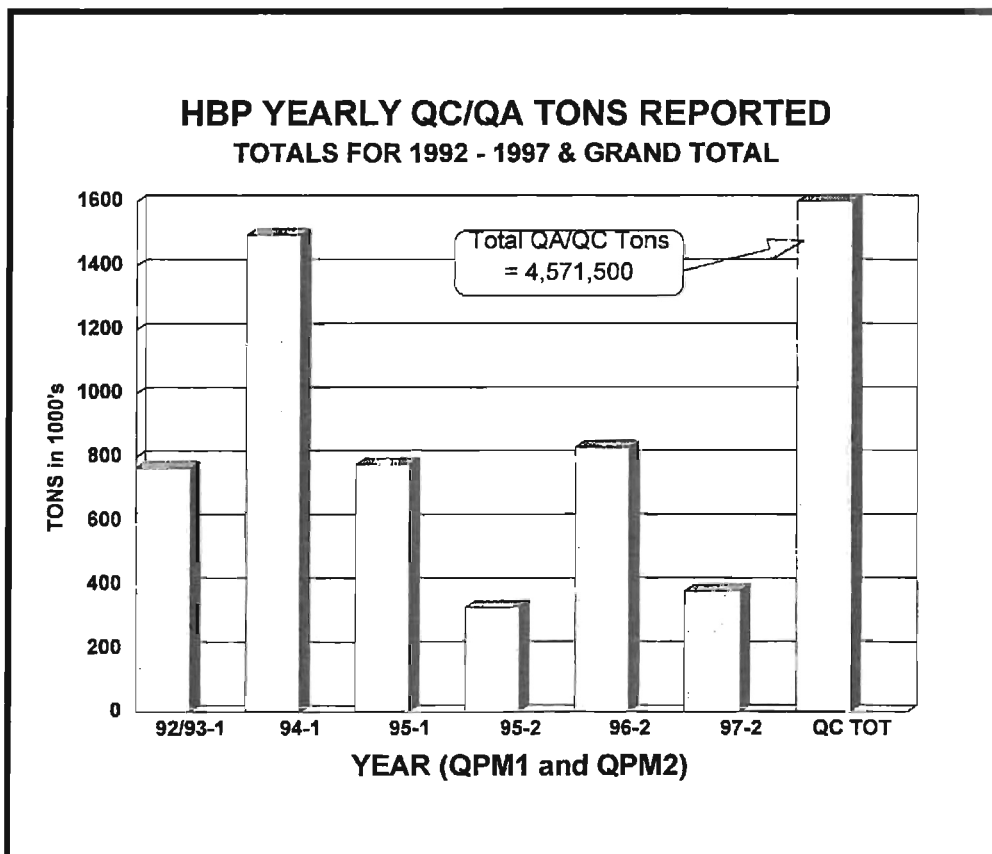


Figure 10

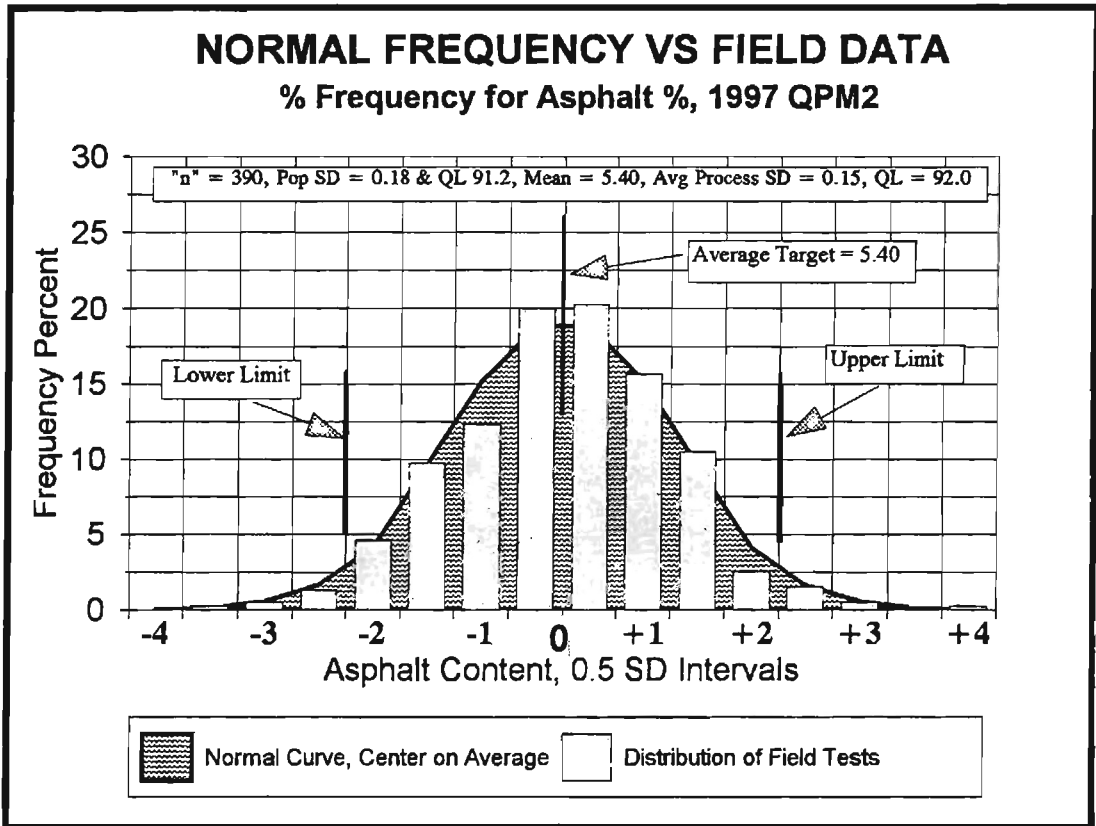


Figure 11

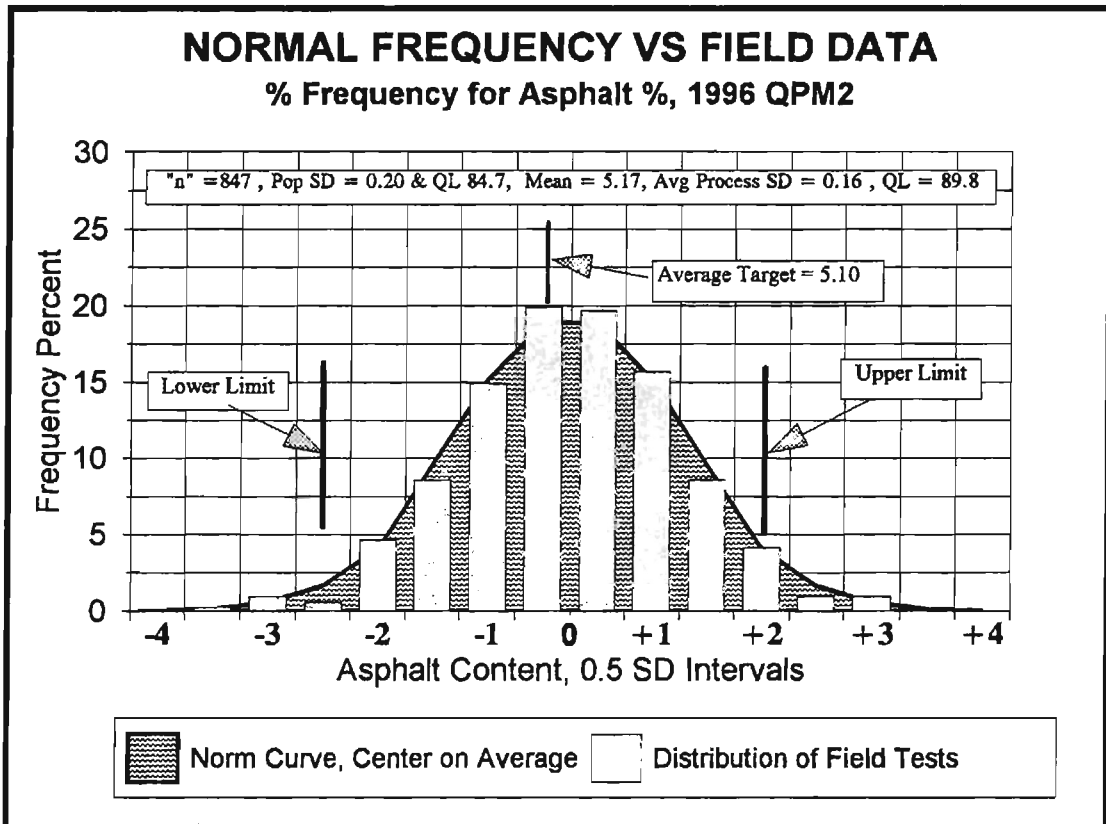


Figure 12

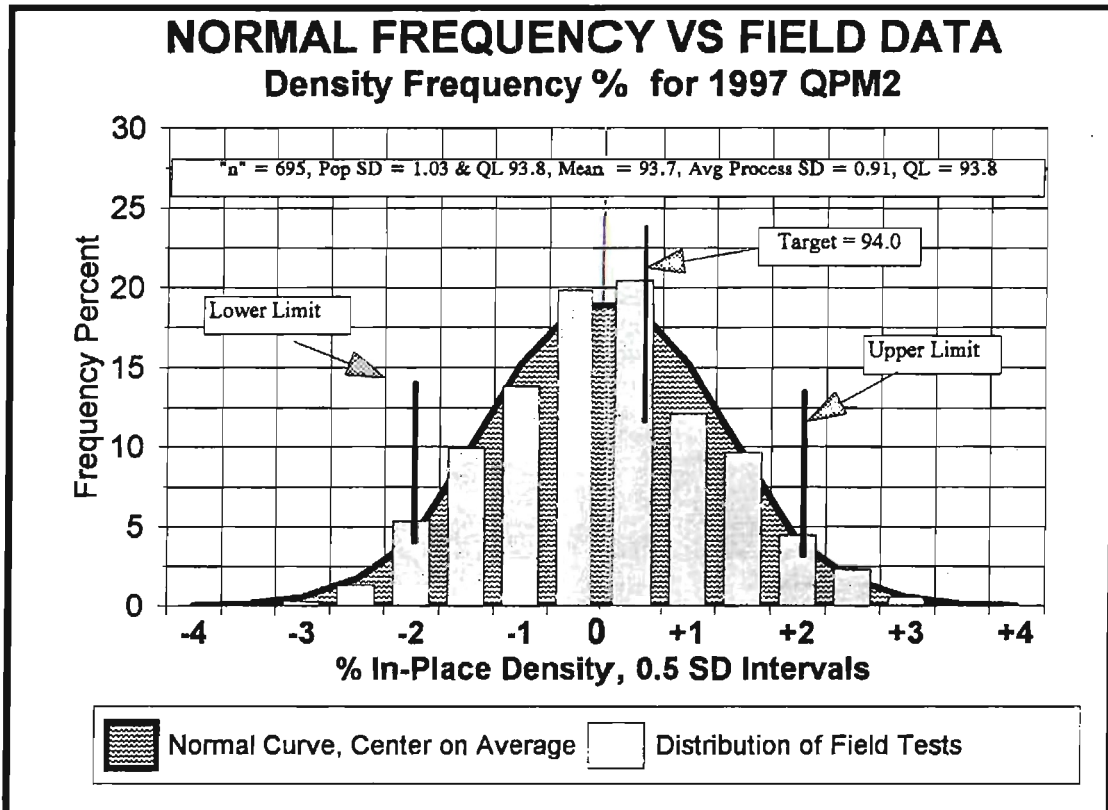


Figure 13

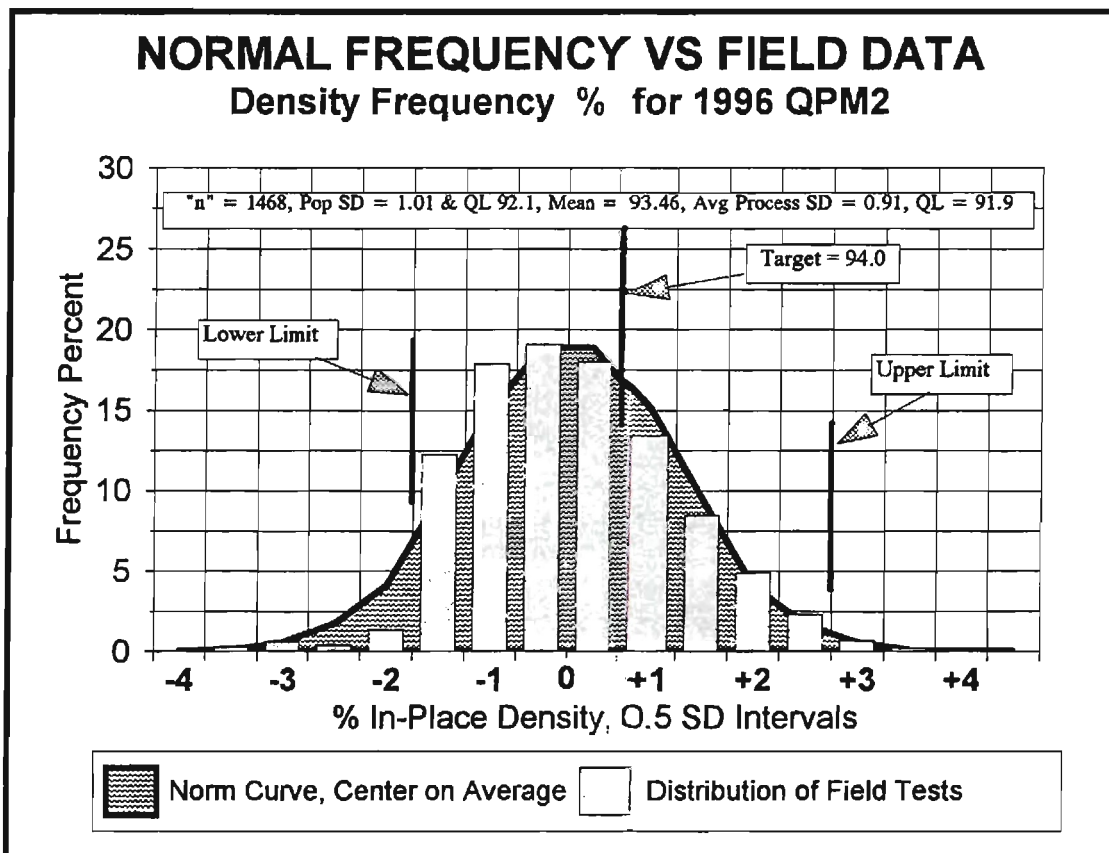


Figure 14

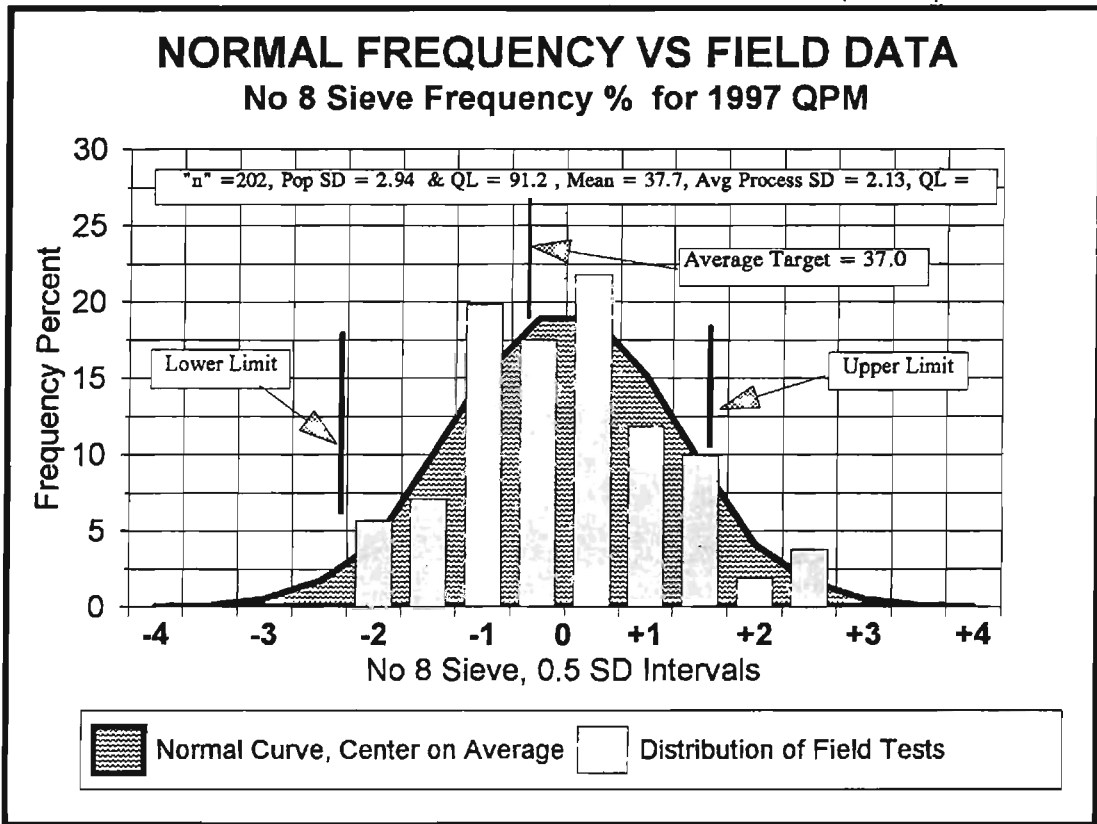


Figure 15

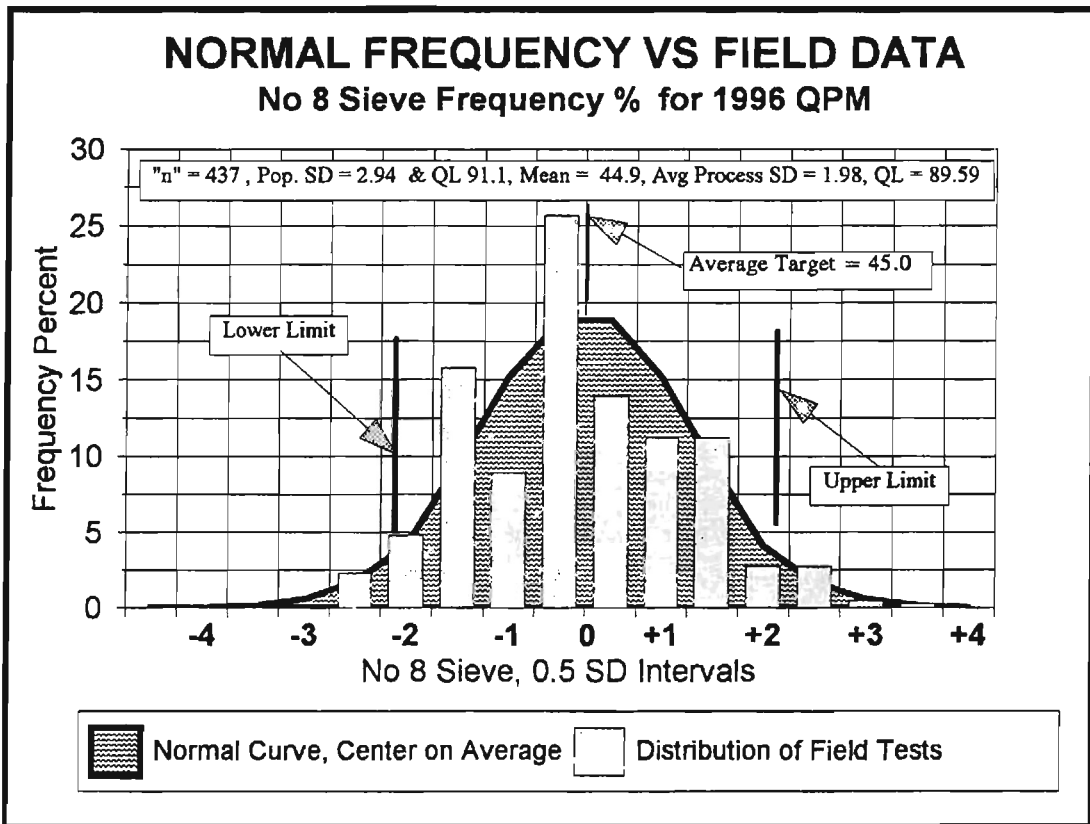


Figure 16