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# HBP Pilot Void Acceptance Projects Completed in 1993-1996

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# HOT BITUMINOUS PAVEMENT PILOT VOID ACCEPTANCE PROJECTS COMPLETED IN 1993 -1996

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# HOT BITUMINOUS PAVEMENT PILOT VOID ACCEPTANCE PROJECTS COMPLETED IN 1993 -1996

# **BACKGROUND OF VOID ACCEPTANCE PILOT PROJECTS**

In the late 1980's the Colorado Department of Transportation (CDOT) was very actively engaged in improving the performance of hot mix asphalt. Rutting was identified as one of the major problems and seemed to be closely related to mixture volumetric properties. By 1990 the Federal Highway Administration was proceeding with Demonstration Project No 74, Field Management of Asphalt Mixes. This project focused on measuring and controlling the volumetric properties of asphalt mixes concurrently with their manufacturing and placement. There are a number of involved test procedures necessary to accomplish volumetric control, but specifying two end result parameters, voids in the mineral aggregate (VMA) and air voids (AV), were selected by CDOT to quantify volumetric properties.

# IMPLEMENTATION OF VOID ACCEPTANCE PILOT PROGRAM

In 1991, D'Angelo and Ferragut <sup>(1)</sup> reported on findings from Project No. 74. Their work showed the importance of field management of asphalt mix volumetric control. In 1993 CDOT took two significant actions towards volumetric end result specifications:

- (1) They participated in Demonstration Project No. 74 by doing void control on three hot mix asphalt projects construction. Only one of the three had formal Void Acceptance specifications with provisions for incentive and disincentive payments included. The contractors and CDOT field personnel cooperated in accomplishing routine volumetric testing on the other projects. Aschenbrener, CDOT mix design engineer, reported<sup>(2)</sup> on this work in January 1994. He concluded that meeting void acceptance (VA) specifications would not ensure that hot mix asphalt would be high in quality, but only that the field mix would match the laboratory design. This initial effort demonstrated the potential for successfully controlling the void properties of asphalt mixtures in Colorado during construction.
- (2) They announced their intent to fully implement QC/QA void acceptance specifications. Target date was set as about 1997. Implementation was to be preceded by a series of pilot projects which would be evaluated as they were constructed. This would ensure feasibility of adopting the VA concept and serve as a basis for adjustments in parameters.

By the end of 1996, eleven VA pilot projects had been let to contract, including one that Aschenbrener reported<sup>(2)</sup> on in 1994. Two of the eleven will not be completed until 1997, leaving nine completed VA projects. An "Explanation of the CDOT Void Acceptance Pilot Program" by Aschenbrener is attached as Exhibit 1. It sets forth a chronological outline of the steps taken by CDOT as they have carefully moved towards VA specification implementation.

## SUMMARY REPORT ON THE COMPLETED VA PILOT PROJECTS

This summary report is a compilation of the hot bituminous pavement VA data reported by the field personnel on the nine projects. It is not intended as a thorough study on field control of voids during construction or the potential performance benefits. In 1992, Aschenbrener reported <sup>(3)</sup> on a comprehensive CDOT investigation of rutting performance of pavements in Colorado. Among other important findings, the report established the need for close volumetric control during construction.

# QC/QA Pilot Program for HBP Using Conventional Tests

In 1992, CDOT implemented pilot QC/QA specifications for hot bituminous pavement (HBP). The specifications require field evaluation for materials pay factors (PF) to be done on three elements, in-place density (compaction), asphalt content and aggregate gradation. Quality acceptance (QA) is based on random samples and tests by CDOT on the three elements. The results are evaluated by standard statistical methods and the percent within tolerance, or quality level (QL), is established. PFs are calculated from the QLs and the number of tests in each process to determine incentive/disincentive (I/D) payments. The contractor is required to test the same elements (at a greater frequency) and use the results for quality control (QC). Comprehensive requirements are included in the QC testing schedule.

Under the pilot specifications (QPM 1, the computer software designation), over 3 million tons of HBP were produced during four construction seasons, 1992-1995. The pilot program had been scheduled for completion in 1994, but several projects were held over and completed in 1995. Following collection and analysis of the 1994 data, a revised and updated QC/QA standard special specification (QPM 2) was implemented in 1995. To date there have been four reports on the program; in 1993, 94, 95 and 96  $(^{(4),(5),(6)\&(7)})$ . A fifth report<sup>(8)</sup> is now in progress on the QPM 2 work completed in 1996. The QPM 1 and 2 programs proceeded mostly independent of the VA projects during the same time period. The VA specifications were similar to QPM 1 in format, except that contractors were not required to perform quality control testing. Exhibit 1 provides additional information.

### THE VOID ACCEPTANCE PILOT SPECIFICATION

The VA specifications have no field aggregate gradation requirements. Studies have shown that gradation is only subjectively related to performance. Other aggregate characteristics affect mix volumetric properties, and consequently performance, but are difficult to measure or specify. It is expected the contractors will learn to carefully control aggregate characteristics in relation to their motivation by the I/D schedule. As a result, future pavements built under VA specifications are expected to perform in a superior manner to pavements built under conventional specifications. CDOT is selectively evaluating the VA pilot projects for rutting and changes in voids after subjection to traffic. Data is not yet available, but no performance problems have been reported.

Page 3

The VA pilot specification (special provision) used for the three projects completed 1996 is attached as Exhibit 2. It consists chiefly of revisions to Section 105, Control of Work, and revisions to Section 106, Control of Materials (as pertaining specifically to this Item). The specification for the first six projects was essentially the same, except Stability was included as an element. The mixes on these six projects were designed using the Texas gyratory (TxG) for laboratory compaction and the Hveem stabilometer to measure stability. The Superpave<sup>TM</sup> Level 1 Mix Design <sup>(9)</sup> was used for the last three projects and the two now under construction. On page 4 of Exhibit 2, there are two Tables for element factors. The first table was used with the Superpave<sup>TM</sup> (SP) projects, the second table was included with the TxG projects. There may have other minor differences between the two specifications.

## SUMMARIZED DATA FROM VA PILOT PROJECTS

Table 1 is a summary of field data from the nine VA pilot projects as submitted from the field to the Construction & Materials Branch. The projects are sorted by year completed and subaccount number, then by process number. Where there were two or more processes (defined as continued production under a single job-mix formula) on a project, the totals and averages, weighted by tons, are listed for each element. The abbreviated column headings identify the components summarized and are mostly self explanatory. There are two PF columns, first for VA and second for QPM 2. The QPM 2 data was not a component of the projects, but was added for comparison. Future VA projects are expected to use the method for PF calculations. Contractor's Code refers to codes used by the CDOT for the various contractors in evaluating QC/QA. The last column is for Aggregate Grading designation used on the projects. "C" is 3/4" nominal and "CX" is 1/2" nominal aggregate size mixes designed by TxG. SP indicates 3/4" nominal size mixes designed by Superpave<sup>TM</sup> gyratory.

In Table 2, the VA data is sorted by element, by TxG or SP, then by project and process. Each element group has a composite line for TxG and SP, then finally a composite line is shown where the data for the two mix design methods have been combined. All average values are weighted by tons represented. For each process, the target (job mix formula, or minimum for stability) is shown, followed by the algebraic difference of the process average test result from the target value. For information, the absolute difference is shown for each element group below the composite line. The significance of this can be demonstrated by looking at the composite line for all AC content tests. The algebraic difference between the target and the process averages is zero; so, on the average, the field tests were right on target. The absolute difference, however, is 0.07, showing that without regard to sign, the average process was 0.07 from target. The absolute value is more closely related to the average QL of 84.9.

Finally, at the end of Table 2, the Item composite values for the TG group, the SP group and the combination are shown. It is not possible to combine data where the order of magnitude is different, such

as SD for the various elements. However, QL, PFs and I/D have been composited by calculating element averages weighted by "W"

# List of Figures

For each element in both groups, frequency distribution histograms have been drawn and for selective elements, accumulated frequency curves are shown. The figures follow the tables at the end of the text, and are identified in Table A.

	Descriptio	n of figures	
Description	Fig. No.	Description	Fig. No.
AC%, Normal Curve and Field Distribution, Texas Gyratory	1	VMA, Normal Curve and Field Distribution, Texas Gyratory	9
AC%, Normal Curve and Field Distribution, Superpave	2	VMA, Accumulated Frequency, Normal Curve & Field Curve, TxG	10
Density, Norm Curve & Field Dist, TxG, Values in Whole Numbers	3	VMA, Normal Curve and Field Distribution, Superpave	11
Density, Normal Curve and Field Dist TxG, Values Reported to 0.1%	4	VMA, Accumulated Frequency, Normal Curve & Field Curve, SP	12
Density, Accum. Frequency, Norm Curve & Field, TxG, Values to 0.1%	5	Air Voids, Normal Curve and Field Distribution, Texas Gyratory	13
Accumulated Frequency, Norm Curve SP Density, Values to 0.1%	6	Air Voids, Accumulated Frequency, Normal Curve & Field Curve, TxG	14
Density, Normal Curve and Field Dist SP, Values Reported to 0.1%	7	Air Voids, Normal Curve and Field Distribution, Superpave	15
Stability, Normal Curve and Field Distribution, Texas Gyratory	8	Air Voids, Accumulated Frequency, Normal Curve & Field Curve, SP	16

Table A Description of Figures

# Discussion of Figures and Related Data

Only the density element has a common job mix target (94.0) for all processes in both VA groups. No adjustment or shift of data was necessary in order to plot distribution curves for density. For the other element groups, it was necessary to shift each process set to a common target in order to plot frequency charts and calculate pooled (total population) statistical data. This was accomplished by shifting the element sets to a common target, approximately the average of the group. For example, the average target for AC% in the TxG group is 5.1. The target for the first set listed is 4.8, therefore 0.3 was added to each value in the set. The target for the next set is 5.3; so 0.2 was subtracted from each value, and so on. Once the entire group of sets had been adjusted, statistical calculations were made, frequencies calculated and figures plotted.

Frequency distribution histograms have been drawn for each element in each group. An additional drawing was made for the 1993-94 field densities reported only in whole numbers. If these had been included in a histogram with values sorted to 0.1%, the results would be irrational. The asphalt content histograms (Figures 1 and 2) show the data distribution to be near normal and only slightly off target. Accumulated frequency curves were not drawn.

Accumulated frequency curves for other elements (except stability) were drawn as indicated in the above table. If the curves are closely superimposed on the normal curves, it indicates the process was close to target and normally distributed. The charts only indirectly address the magnitude of the SDs; if the SD for the group is larger than normal, then the QL will be low (excessive percent out of tolerance). If the frequency curve is shifted, but closely parallel to the normal curve, the data is normally distributed, but the average is off target. Where there is lack of parallelism (bulges or dips), the data is abnormally distributed and also may be off target. An example is evident in Figure 5 where the TxG field densities (compaction) are abnormally distributed with a dip near the lower tolerance limit (indicating some sort of sampling bias).

Figure 6 shows the SP density data is significantly bulged just inside the lower tolerance and shifted to the left by about 1.1 percentage points (below target). It is squeezed back to the right near the lower limit, indicates missing data, or sampling bias. The VMA accumulated curve (Figure 10) shows the data to be more normally distributed than its histogram (Figure 9) indicates. The average is almost exactly on target. Figure 12 shows the data for SP VMA to be poorly distributed and 0.4% below target. The TxG AV data (Figure 14) is bulged and shifted to the left, nearly 0.4% below target. Finally, the histogram and frequency curve for SP AV (Figures 15 & 16) show poor distribution of data and a shift to the left of target of nearly 0.9%.

The field densities and all volumetric data (except TxG VMA) are low, indicating there were some problems with field control. Lower values may not be too significant for the TxG mixes, as discussed on page 8, TxG Mixes, etc. But the lower values for the SP mixes could indicate borderline acceptability for performance (see discussion on page 9, SP Mixes, etc).

# **DISCUSSION OF ELEMENT DATA**

## Standard Deviations

When the VA pilot program was initiated in 1993, expected process SDs for VMA, VA and stability were estimated<sup>(2)</sup> from tests performed on six conventional HBP projects constructed in 1992. The data was used to establish tolerance limits and "V" factors for each element . "V" is approximately one historical SD and is used in VA specifications (and QC/QA) to evaluate single sample lots for PF when results are outside tolerances. If within the tolerances, the PF is 1.0. Tolerance limits for double limit elements are

typically four average historical SDs in width. Tolerance limits for asphalt content and density were already in effect and historical data was available to establish their "V" factors.

Table B lists SD and tolerance values related to the Pilot VA program and the QPM projects. SD values from the six 1992 projects for VMA, AV and stability along with 1991 historical values for asphalt content and density are listed as base values in the first line.

		ce Table (Data v			
Identification	AC%	Density	Stability		Air Voids
6 '92 Projs or Hist	0.18 <sup>(7)</sup>	1.05 <sup>(7)</sup>	3.6 <sup>(2)</sup>	0.51 <sup>(2)</sup>	0.62 <sup>(2)</sup>
VA Spec, "V"(Eds.1)	0.20	1.10	3.0	0.6	0.6
6 TxG VA Projs <sup>(Tb 2)</sup>	0.19	1.00	2.0	0.36	0.51
3 SP VA Projs <sup>(Tb 2)</sup>	0,17	0.87	NA	0.49	0.58
W'ted Avg 9 VA Projs <sup>(75</sup>	0.19	0.97	NA	0.39	0.52
1991-95 QPM 1 <sup>(7)</sup>	0.15	1.01	NA	NA	NA
1995-96 QPM 2 <sup>(9)</sup>	0.17	0.93	NA	NA	NA
QPM 2 Spec, "V"	0.20 <sup>(Std Prov)</sup>	1.10 (Stal Prov)	NA	NA	NA
	Current To	olerances For VA	Elements		
VA or QPM Toler, Width	0.6(Stil Spec)	4.0 <sup>(StalSpec)</sup>	NA	2.4 (End 1)	24 (Eat 1)

 Table B

 SD & Tolerance Table (Data with References)

Examination of the above table shows the values used in the VA specification are very reasonable when compared to the summarized field data. Because construction techniques for achieving density and asphalt content are essentially the same for VA projects as for QC/QA projects, the QPM 2 summary (representing 14 times as many tons) is a better indicator of actual field performance than is the SP VA summary (1996 work). An analysis of Sellers risks shows "V" should be about 1.2 times the historical SD for a recommended 5% risk. The current "V"s (VA and QPM 2) for AC% and density are almost exactly 1.2 times the QPM 2 averages. No changes are recommended. For the two specifications, the tolerance widths for these two elements are very close to four times the QPM 2 averages; these tolerances have been used by CDOT for HBP for about seven years. Experience shows the they are satisfactory; no changes are recommended.

The relevance of Stability tests on SP mixtures is currently being investigated. Stabilities may be specified on future VA projects using SP. No change is recommended in the "V" factor at this time. SD is not normally used to establish the tolerance limit for single limit specifications.

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For this evaluation, some of the most important information comes from the volumetric summaries. Based on the limited number of pilot tests, the summaries in Table B indicate the tolerance widths and "V" factors for VMA and AV are approximately correct. The change from TxG to SP compaction has probably affected VMA and AV field data. But the extent is not known because of other concurrent changes taking place, as summarized by Aschenbrener in Exhibit 1, such as: (1) Test procedures were modified to take out ambiguities following round robin testing in 1994 and 1995, (2) in 1996, CAPA certification was required for the first time for all testers, (3) from 1991-1995 TxG equipment was phased in, then in 1996 the SP procedure was introduced and used on the SP projects without previous experience and (4), from 1993 to the present, there have been a number of changes in VA specifications and project quality management. For these reasons no changes are currently recommended for VMA and AV.

### Target and Mean - Target

Based on all individual test values, the data in the columns (Tables 1 and 2) to the right of the tons column, have been calculated for each element in each process. The targets (job mix formulas) were as established on the projects per specifications. The mean (average) value for the process, minus target value is the algebraic difference. For example, if two AV processes of the same size had a 0.5 and -0.5 differences from their targets, the average distance from the targets would be zero. The average absolute difference would be 0.5, which is more closely related to the overall QL than is the algebraic average. The composites show both values.

### Quality Level and Pay Factors

QL is calculated by CP-71<sup>(10)</sup> and represents the estimated percent of test results within tolerances. SD, distance of process mean from tolerance limits and number of test values ("n") all contribute to the calculation. PF formulas for VA and HBP are modeled after the WASHTO<sup>(11)</sup> tables for PF, based on "n" and QL. Basically, for unlimited "n", PF = 1.0 when QL = 93. As "n" decreases, the required QL to achieve a PF of 1.0 decreases. This is related to sellers risk due to sampling error as "n" grows smaller. When "n" is three (minimum for statistical analysis), a QL of 68 provides a PF of 1.0. There is pay incentive, based upon QL and "n". The VA formulas for PF are included in Exhibit 2. QPM 2 PF formulas are slightly modified from WASHTO and there are additional ones for larger "n"s. The QPM 2 PF column (Tables 1 and 2) is provided for comparison; the procedure is to be used for future VA projects. Over all, there is less than one percent difference in the two methods, with QPM 2 paying slightly less (the effect of paying less for processes with larger "n"s).

The VA I/D\$ Column shows the actual dollars based on tons x \$per ton x (PF-1.0). There was a total incentive of \$47,069 for the TxG projects. The total disincentive was -\$129,488 for the three SP

projects, which included -\$116,499 for density on a single project process. This resulted in only -\$13,000 for the other elements and processes.

The less than desired results for VMA and AV on the SP projects can be partly attributed to the contractors' unfamiliarity with SP technology (i.e., SP gradations interrelated with voids and field density). Another factor may have been CDOT's unfamiliarity with the SP gyratory compactor. These two things, combined with the sampling and testing variances already inherent with HBP testing, produced lower QLs than expected for the volumetric properties.

# Asphalt Content and Density

The QLs and PFs for the AC% and Density elements are significantly lower for both groups of VA projects than for QPM 1 and QPM 2 projects for the same contractors during the same calendar periods. Table C compares data taken from Table 2 and 3.

	AC7		cusity	Data, V	A & QI		4			
	"	n"		SD	Ab. N	fn -Tar.		)L	QPM	I 2 PF
Group Identification	AC	Dn	AC	Dn	AC	Dn	AC	Dn	AC	Dn
VA by Texas Gyratory	316	615	0,19	1.00	0.06	0,81	86.3	84.1	0.997	0.966
1991-95, QPM 1	3092	5729	0.15	1.01	0.07	0.67	99.4	88.1	1.017	0.992
VA by Superpave	86	171	0.17	0.87	0.13	1.20	79.6	77.7	0.944	0.907
1995-96, QPM 2	1189	2090	0.17	0.93	0.07	0.56	89.5	91.9	1.006	1.016

Table CAC% and Density Data, VA & QPM 1 & 2

The QL and PFs for the VA groups were significantly below the QPM groups. The total number of tests for the VA groups is much less, so there is danger in reaching conclusions from such small samples, particularly for SP. It appears there are complex interrelations between the mix characteristics necessary for volumetric optimization and field compaction when using SP gradations.

For conventional HBP where there are specified gradations (and no voids specifications on field mixes), sieve targets can be changed or established by the contractor (as approved) without negatively affecting the PF. Gradations could be selected in order to more easily achieve compaction without particular regard to the effect on the voids characteristics. Successful implementation of VA specifications on SP projects will require training and experience for CDOT and the contractors.

### HBP Pilot Void Acceptance Projects, 1993 - 1996

### TxG Mixes, Stability, VMA and Air Voids

There was virtually no problems meeting the minimum specified stability values on the TxG mixes. The VMA average was almost right on target. The AV average was only 0.3% below target. Medium to low TxG compactive effort was used for design on all of these projects. Aschenbrener noted<sup>(3)</sup> that field mixes with air voids above 3.0% by low laboratory compactive effort should have good rut resistance. Figure 14, accumulative frequency for TxG air voids, shows that 85% of the tests yielded AV greater than 3.0%. The as-built field densities show only 0.14% more AV (less density) than the QPM 1 projects built during the same time period. The TxG designed pavements can be expected to have good resistance to rutting.

## Superpave Mixes, VMA and Air Voids

The SP mix design procedure<sup>(9)</sup> does not include Hveem stability testing. For SP compaction, loose, hot asphalt mixtures are placed in molds and subjected to gyrations until the density is approximately 98% of maximum theoretical (2.0% AV). Densities between initial and end pont are estimated by automatic specimen height measurement and interpolation to find percent air voids at design gyrations. The completely compacted test specimens are not satisfactory for stability testing. To test for stability, separate specimens compacted at design gyrations are required. Until now, this has not been done routinely, but data is currently being accumulated. Stabilities may be required on SP mixtures in the future.

The SP mixes have an average field VMA about 0.4% (Table 2) below target. This is not particularly significant. The SP average AV are (Table 2) below target a greater distance than average for the TxG mixes. But not too much weight should be given to this data, their were only a couple of small processes where the average AV were below 3.0%. The SP mixtures can be expected to have adequate nut resistance, except possibly for some finely graded trial mixes. Again, this emphasizes the need for time to learn the interrelation between SP gradations, volumetric characteristics and density achievement.

## COMMENTS

The number of changes being made in procedures and equipment, combined with the limited number of projects and field samples, makes it risky to make conclusions. Following is a list of comments:

1. The six TxG projects are expected to perform satisfactorily for rut and fatigue resistance. Eighty-five percent of the field AV tests are above the critical lower limit of 3.0% and the average is only 0.29% below target. The as-built field densities show only 0.14% more AV (less density) than the QPM 1 projects built during the same time period

2. Not enough data is available to predict performance on the SP projects. There needs to be more time (and SP projects) to allow CDOT personnel and the contractors to become familiar with Superpave technology. The analysis of volumetric data is complicated by its interrelation with SP technology.

3. The "V" factors and specification widths for the elements currently being evaluated on the SP projects are satisfactory, no changes are recommended at this time.

4. For both TxG and SP, there is reduction in air voids by laboratory compaction of field mixed materials versus laboratory mixed materials from same source components. This confirms the observed and documented reduction in field AV (reported by CDOT and others).

5. The data submitted to the Pavement section for analysis seems to indicate poor compliance with the requirements for compaction test sections. The first density test result in a process is supposed to be the average of the seven random tests on a test section. For work to proceed without more test sections, the PF for the first test section must be 1.0, or better. At a normal SD of 1.0, the mean value must be at least 93.0. Of 12 processes built in 1995 & 1996 (TxG and SP), 7 had first values reported ranging from 91.8 to 92.8. If the test section requirements had been adhered to, there would probably have been better compliance with overall density and volumetric requirements on these processes.

6. All three frequency histograms for field density tests (Figs 3, 4 and 7) show significant sampling bias and abnormal distribution. There is a lack of test values just below or at the minimum tolerance (92.0) with a preponderance of values just inside the limits. This may indicate a tendency towards discarding values just below the lower limit and substituting "representative" values from locations near by.

7. There is some abnormalcy in the distribution of test values around their averages for all elements for both TxG and SP. But sampling bias is not as evident as it is for density. For all the elements, part of the poor distribution can be attributed to the experimental nature of the work where frequent changes in the field processes were made. Pooled data can be expected to reflect the many process changes.

## RECOMMENDATIONS

1. Consideration should be given to allowing the contractor the option of making a laboratory adjustment in design voids (higher laboratory AV) to account for anticipated decreases on construction. This might greatly reduce the amount of trial and error associated with field adjustments. There would have to be a documented prediction procedure, based on historical data for the individual contractor and source. 2. The requirements for compaction test sections should be fully adhered to.

3. Additional efforts should be made to train contractor and CDOT test persons in the proper procedures for random sampling, particularly for pavement density. The proposed pilot projects, with the contractors doing control testing for pay, present opportunity to identify sampling and testing irregularities by use of statistical "t" and "F' test procedures.

4. It is proposed that the disincentive pay factor procedures be stiffened (greater disincentive when the PF is less than 1.0). This would require the "W" factors be changed when PF is less than 1.0. Contractors who perform well and have PFs greater than 1.0 would not be affected by this change. Those inclined to accept disincentive payments in lieu of producing fully acceptable work would have greater incentive to produce higher quality work. This same recommendation is appropriate for QPM 2 projects.

5. It is recommended that as soon as feasible, the conventional HBP QPM 2 specification be merged with the VA specifications. CDOT has already stated this intent. This recommendation is to add emphasis to that objective. In the mean time, VA pilot work should proceed carefully at the same time the Superpave procedure is being implemented for conventional HBP.

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7. Brakey, Bud A. (1996), "HBP QC&QA Projects Constructed in 1995 Under QPM 1 and QPM 2 Specifications", fourth annual report, Report No. CDOT-R-96-9.

8. Brakey, Bud A. (1997), "HBP QC&QA Projects Constructed in 1996 Under and QPM 2 Specifications", CDOT Construction & Materials Branch, Not Formally Published at this writing.

9. "Superpave<sup>™</sup> Level 1 Mix Design", Asphalt Institute Superpave<sup>™</sup> Seies No.2 (SP-2), Asphalt Institute, P.O. Box 14052, Lexington, KY 40512-4052.

10. Colorado Procedure 71-94 For Determining Quality Level (Percent Within Tolerance limits), 1997 Field Materials Manual. Colorado Department of Transportation, 4201 East Arkansas, Denver CO 80222.

11. WASHTO Model Quality Assurance Specifications, Prepared for WASHTO Subcommittee on Materials and on Construction, in Cooperation with the FHWA, August, 1991.

# Table 1 HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY PROJECT AND MIX DESIGN FOR 1993 - 96 VOID ACCEPTANCE PROJECTS

	-	MIX DE	1		-						1	DJEC		T	[	1
PROJECT		YR COM,	1	ELE-	BID \$/	TONS			CESS		QUAL	VA	QPM2	VA	CNT	AGG
LOCATION	#	SUBAC #	#	MENT	TON	1000	<u>"n"</u>	SD	TARG	- TAR	LEVL	PF	PF	VD\$	CDE	GRAD
													·	And Mar P	1 inn	AR
CX 11-0006-17																
6th Ave, Wads-Fed	6	93,93092	Α	Dns%	\$29.25	21.1	42	0.79	94.0	-0.76	94.3	1.039	1.035	\$9,639	W2	С
6th Ave, Wads-Fed	6	93,93092	A	AC%	\$29.25	21.1	24	0.20	4.8	-0.06	84.9	1.009	0.988	\$278	W2	C
6th Ave, Wads-Fed	6	93,93092	•	Stab	\$29.25	21.1	24	3.60	35.0	3.20	81.8	0.996	0.965	(\$124)	W2	c
6th Ave, Wads-Fed	6	83,93092	A	VMA	\$29.25	21.1	24	0.38	19.5	-0.63	93.9	1.038	1.041	\$4,696	W2	С
6th Ave, Wads-Fed	6	93,93092	Α.	Voids	\$29.75	21.1	24	0.40	3.3	-0.60	93.5	1.037	1.039	\$6,978	W2	с
PROJECT GRADING "	the second s	ALS & MEAN		monocompanies	\$29.75	21.1	NA	NA	NA	NA	92.9	1.035	1.031	\$21,486	W2	c
14 Mar 11				matter	An mark	Aiken.			A.A. 0	·						· · · · · · · · · · · · · · · · · · ·
STA 0251-131																
Jet SH 165, N & S	2	94,92410	A	Dns%	\$28.20	4.4	9	1.45	94.0	0.11	84.4	1.007	1.008	\$351	W2	CX
Jct SH 165, N & S	2	94,92410	B	Dns%	\$28.20	10.0	20	1.30	94.D	-1.30	70.0	0.901	0.877	(\$11,129)	W2	CX
Jot SH 165, N & S	2	94,92410	С	Drs%	\$28.20	4.4	8	1.51	94.0	-1.50	62.4	0.771	0.877	(\$11,288)	W2	CX
Jct SH 185, N & S	2	94,92410	D	Draff	\$28.20	21.4	43	1.32	94.0	-0.44	85.3	0.968	0.969	(\$2,778)	W2	CX
Jot SH 165, N & S	2	94,92410	E	Dns%	\$28.20	14.7	30	1.11	<u>84.0</u>	-1.25	74.9	0.880	0.915	(\$18,242)	W2	CX
PROJECT GRADING "C	X" TOT	ALS & MEAN	SFORI	DENSITY		54.9	110	1.28	94.0	-0.85	77.8	0.930	0.934	(\$43,087)	W2	CX
	_						_									
Jot SH 165, N & S	2	94,92410	A	ACN	\$29.20	4.4	5	0.13	5.4	-0.08	99.0	1.050	1.030	\$315	W2	CX
Jct SH 165, N & S	2	94,92410	В	AC%	\$28.20	10.0	10	0.18	5.1	-0.02	91.7	1,032	1.037	\$447	W2	CX
Jot SH 165, N & S	2	94,92410	C	AC%	\$28.20	4.4	4	0.13	5.5	-0.09	100.0	1.049	1.030	\$303	W2	CX
Jot SH 165, N & S	2	94,92410	D	AC%	\$28.20	21.4	21	0.16	5.1	-0.04	93.2	1.036	1.032	\$1,084	W2	CX
Jet SH 165, N & S	2	94,92410	É	AC%	\$28.20	14,7	15	0.11	5.5	-0.05	99.3	1.049	1.050	\$1,018	W2	CX
PROJECT GRADING "C	X" 101/	ALS & MEANS	S FOR /	NC%		54.9	55	0.15	5.3	-0.05	95.6	1.041	1.037	\$3,165	W2	CX
	_			-			_									
Jct SH 165, N & S	2	94,92410	•	Stab	\$28.20	4.4	5	1.00	35.0	12.00	100.0	1.050	1.030	\$313	W2	CX
Jct SH 165, N & S	2	94,92410	8	Stab	\$28.20	10.0	10	2.30	35.0	12.60	100.0	1.050	1.040	\$704	W2	CX
Jet SH 165, N & S	2	94,92410	C	Stab	\$28.20	4.4	4	2.20	35.0	9.80	100.0	1.050	1.030	\$308	W2	CX
Jet SH 165, N & S	2	94,92410	Q	Stab	\$28.20	21,4	21	1.20	35.0	18.30	100.0	1,050	1.050	\$1,507	W2	CX
Jot SH 165, N & S	2	94,92410	E	Stab	\$28.20	14.7	15	1.20	35.0	8.30	100.0	1.050	1.050	\$1,038	W2	<u>cx</u>
PROJECT GRADING "C	X 101/	LS & MEANS	S FOR S	TABILITY		54.9	<del>55</del>	1.40	36.0	13.40	100.0	1.050	1.045	\$3,871	₩2	cx
							-						4 000			
Jet SH 165, N & S	2	94,92410	•	VMA	\$28.20	4.4	5	0.21	14.0	-0.96	88.1	1.031	1.030	\$1,174	WZ	CX
Jet SH 165, N & S	2	94,92410	B	VMA	\$28.20	10.0	10	0.21	14.0	-1.13	62.9	0.884	0.881	(\$9,831)	W2	CX
Jct SH 165, N & S	2	94,92410	C	VMA	\$28.20	4.4	4~~~	0.35	13.0	0.97	71.4	0,985	0.985	(\$573)	W2	CX
JCI SH 165, N & S	2	94,92410	D	VMA	\$28.20	21.4	21	0.24	14.0	-0.99	80,7	0.991	0.957	(\$1,875)	W2	CX
Jot SH 165, N & S	2	94,92410	E		\$28.20	14.7	15	0.25	14.0	-0.42	99.7	1.050	1.050	\$8,170	W2	<u> </u>
PROJECT GRADING 10		ls & Means	FUR V	MPA		54.9	55	0.24	13.9	-0.70	82.4	0.990	0.976	(\$4,736)	W2	CX
IN OUR OF MILL O	-	04 00440		Maida	ema 66			0.00	40	4 47	<b>A</b> D D	0.003	0.000	<b>6</b> 4 9700		<b>CY</b>
Jet SH 165, N & S	2	94,92410	A	Voids	\$28.20	4.4	5	0.28	4.0	-1.12	60.2	0,903	0.902	(\$4,878)	W2	CX
Jet SH 165, N & S	2	94,92410	B	Voids	\$28.20	10.0	10	0.38	4.0	-0.82	94,7	1.040	1.040	\$4,461	W2	CX
Jot SH 165, N & S	2	94,92410	C	Vaids	\$28.20	4.4	4	0.37	3.0	0.85	81.6	1.022	1.025	\$1,087	W2	CX
Jet SH 165, N & S	2	94,92410	D	Voids	\$28.20	21.4	21	0.48	4.0	-0.52	95.1	1.041	1.048	\$9,768	WZ	CX
Jot SH 165, N & S	2	94,92410	E	Voids	\$28.20	14.7	15	0.29	3.0	0.19	100.0	1.050	1.050	\$8,301	WZ	CX
PROJECT GRADING *CX						54.9	55	0.39	9.7	-0.29	92.4	1.030	1.033	\$18,738	W2	
PROJECT GRADING "C	A" TOT/	ALS & MEAN	s fur i			54.9	NA	NA	NA	NA	85.1	0.984	0.963	(\$22,049)	WZ	CX
	~	A4 00 (		Death						0.00						~
Jot SH 165, N & S	-	94,92410	A		\$21.90	38.5	80	1.12	94.0	-0.86	84.0	1.005	0.939	\$1,696	WZ	c
Jot SH 185, N & S			A1		\$21.90	1.5	NA AZ	NA	NA	NA	NA	1.005	0.500	\$88	W2	C
Jet SH 185, N & S		94,92410	B		\$21.90	8.5	17	1.11	94.0	-1.12	78.4	0.980	0.961	(\$1,489)	W2	c
Jet SH 165, N & S		84,92410			\$21.90	3.4	7	0.53	94.0		100.0	1.035	1.035	\$1,039	W2	C
Jet SH 165, N & S		94,92410			\$21.90	4.5	9	1.01	94.0	-0.44	94.7	1,040	1.040	\$1,560	W2	<u> </u>
PROJECT GRADING "C"	TOTAL	5 & MEANS F	OR DE	YTEN		56.3	113	1.07	94.0	-0.85	85.0	1.008	0.971	\$2,872	W2	C

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Table 1
HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY PROJECT
AND MIX DESIGN FOR 1993 - 96 VOID ACCEPTANCE PROJECTS

	_	NIX DE			_		-					DJEC		1.4	-	
PROJECT	RG	1	1	ELE-	81D \$/		1	<u> </u>	CESS	1			QPM2	VA	CNT	AG
LOCATION	#	SUBAC #		MENT	TON	1000	"n"	SÒ	TARG		LEVL	PF	PF	VD \$	CDE	GR
Jot SH 165, N & S	2	94,92410	•	ACM	\$21.90	38.5	40	0.24	5.3	0.09	78.0	0.908	0.698	(\$3,89';)	W2	c
Jet SH 165, N & S	2	94,92410	<b>A1</b>	AC%	\$21.90	1.5	2	NA	5.3	-0.82	NA	0.831	0.500	(\$279)	W2	c
Jct SH 165, N & S	2	94,92410	8	AC%	\$21.80	8.5	9	0.17	5.1	0.14	81.7	0.995	0.995	(\$44)	W2	c
Jot SH 165, N & S	2	94,92410	C	AC%	\$21,90	3.4	3	0.23	5.3	0,14	70.3	1.007	1.002	\$26	W2	c
Jat SH 185, N & S	2	94,92410	D	AC%	\$21.90	4.5	5	0.18	5.3	0.04	94.5	1.045	1.030	\$217	W2	
PROJECT GRADING "C"	TOTA	LS & MEANS	S FOR A	<b>C%</b>		56.3	59	0.22	5.3	0.08	89.8	0.936	0.917	(\$3,972)	W2	c
Jot SH 165, N & S	2	94,92410	A	Stab	\$21.90	38.5	42	1.97	35.0	10.3	100.0	1.050	1.055	\$2,107	W2	c
Jct SH 165, N & S	2	94,92410	A1	Stab	\$21.90	1.5	NA	NA	NA	NA	NA	1.050	0,500	\$83	W2	C
Jct SH 165, N & S	2	94,92410	B	Stab	\$21.90	8.5	9	1.70	35.0	11.30	100.0	1.050	1.040	\$465	WZ	0
Jct SH 165, N & S	2	<b>94,924</b> 10	С	Steb	\$21.90	3.4	3	0.60	35.0	9.30	100.0	1.050	1.025	\$185	W2	c
Jet SH 165, N& 8	2	94,92410	D	Stab	\$21.90	4.5	5	0.60	35.0	B.40	100.0	1.050	1.030	\$244	W2	
PROJECT GRADING "C"	TOTA	LS & MEANS	FORS	TABILITY		66.3	59	1,72	34.1	10.05	<del>9</del> 7.3	1.050	1.034	\$3,085	WZ	Ċ
Ict SH 185, N & S	2	84,92410	A	VMA	\$21,90	38.5	42	0,25	13.0	0.26	100.0	1.045	1.055	\$11,400	W2	c
lct SH 1665, N & S	2	94,92410	<b>⊼1</b>	VMA	\$21,90	1.5	NA	NA	NA	NA	NA	1,045	0.500	\$447	W2	C
lct SH 165, N & S	2	94,92410	B	VMA	\$21.90	8.5	9	0.22	13.0	0.21	100.0	1,060	1.040	\$2,783	W2	c
kat Shi 185, N & S	2	94,92410	C	VMA	\$21.90	3.4	3	0.31	13.0	0. <b>03</b>	100.0	1.050	1.025	\$1,113	W2	c
Lt SH 165, N & S	2	94,92410	D	VMA	\$21.90	4.5	5	0.38	13.0	0.14	100.0	1.050	1.030	\$1,482	W2	C
ROJECT GRADING "C"	TOTA	LS & MEANS	FOR VI	MA		56.3	59	0.26	12.7	0.22	97.5	1.047	1.034	\$17,215	W2	C
ct SH 165, N & S	2	94,92410	A	Voids	\$21.90	38.5	42	0.62	4.0	-0.14	94.6	1.034	1.037	\$11,467	WZ	c
lot SH 165, N & S	2	84,92410	At	Voids	\$21.90	1.5	NA	NA	NA	0.00	NA	1.034	0.500	\$450	W2	c
ct SH 165, N & S	2	94,92410	B	Voide	\$21.90	8.5	9	0.24	4.0	-0.24	100.0	1.050	1.040	\$3,723	W2	c
Ict SH 165, N & S	2	94,92410	¢	Voids	\$21.90	3.4	3	0.21	4.0	-0.83	100.0	1.050	1.025	\$1,484	W2	c
ct SH 185, N & S	2	94,92410	D	Voids	\$21,90	4.5	5	0.52	4.0	-0.60	89.3	1.032	1.030	\$1,240	W2	С
ROJECT GRADING "C"	TOTAL	S & MEANS	FOR A	RVOIDS		68,3	59	0,52	3.9	-0.23	82.7	1.037	1.022	\$18,365	W2	c
ROJECT GRADING "C"	TOTA	LS & MEANS	FOR I	TEM .		68.3	NA	NA	NA	NA	90.3	1.022	0.989	\$37,585	W2	c
ROJECT GRAND TOTAL	LEM	EANS, ALL G			alaanaaaa	111.2	NA	NA	NA	NA	87.8	1.003	0.991	\$15,518	W/2	
		ade a sa	2	Y.Y.		and	A : A					1.32.		ding: .		
TRS 0835 - 031															K1	C
ierce - Nunn	2	95,93262	A	Ons%	\$25.00	22.4	39	1.22	<b>94</b> .0	-94.00	47.1	0.765	0.750	(\$52,574)	K1	С
lerce - Nunn	2	95,93262	8	Dris%	\$33,00	12.8	28	0.98	94.0	-94.00	73.9	0.912	0.901	(\$14,880)	K1	C
ROJECT GRADING "C" 1	TOTAL	S & MEANS	For de	ens		35.2	65	1.12	94.0	-94.00	56.9	0.819	0.805	(\$67,454)	K1 K1	c c
erce - Nunn	2	95,93262	A	AC%	\$25,00	22.4	23	0,19	4.6	-4.60	87.2	1.022	0,999	\$803	K1	С
lerce - Nunn		•		AC%	\$33.00	12.8	13	0.15	5.0	-5.00	93.3	1.020	1.040	\$428	K1	с
ROJECT GRADING "C" 1						35.2	36	0.18	4.7	-4.75	89.4	1.021	1.014	\$1,031	K1	С
ierce - Nunn	2	95,93262	A S	Shab	\$25.00	22.4	23	1.28	40.0	-40.00	1 <b>00</b> .0	1.048	1.050	\$1,343	K1 K1	c c
ierce - Nunn				Stab	\$33.00	12.8	13	3.67	40.0	-40.00	100.0	1.039	1.045	\$825	KI	c
ROJECT GRADING "C" T						35.2	36	2.15	40.0	-40.00	100.0	1.045	1,048	\$2,168	K1	c
															K1	С
ierce - Nunn	2 1	95,93262	A \	/MA	\$25.00	22.4	23	0.30	13.0	-13.00	98.5	1.045	1.050	\$5,018	K1	С
erce - Nunn	2 1	5,93262	B \	/MA	\$33,00	12.8	13	0.46	13.0	-13.00	90.2	1.015	1.026	\$1,287	K1	c
ROJECT GRADING "C" T	OTAL	S & MEANS	for VM	ы		35.2	30	0.36	13.0	-13.00	95.5	1,054	1,041	\$8,285	X1 X1	c c
					P36 00	22.4	28	0.52	4.0	-4.00	90.8	1.016	1.022	\$2,517	K1	c
	2 4	5 83282	۸ ۱	/olda			معه				vv.0	1.910	1.00			<u> </u>
ierce - Nunn		6,83282 /			\$25.00 \$33.00						84.6	0.047	0.002			0
	2 8	5,93262	в у	/oida	533.00	<u>12.8</u> 35.2	1 <u>9</u> 36	0.51	4.2	-4.20	83.8 88.2	0.947	0.993	(\$6,686) (\$4,149)	<u> K1</u>  K1	 

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Table 1
HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY PROJECT
AND MIX DESIGN FOR 1993 - 96 VOID ACCEPTANCE PROJECTS

PROJECT	RG	YR COM		ELE-	BID \$/		TEST	PRC	CESS		QUAL	VA	QPM2	VA	CNT	
LOCATION	#	SUBAC :	# #	MENT	TON	1000	"n"	SD	TARG	- TAR	LEVL	PF	PF	VD \$	CDE	(
C 0361-046																
US 36, Sher - Wads	8	95,1 <b>08</b> 78	A	Dns%	\$23.40	29.1	58	0.88	<del>94</del> .0	-0.53	95.2	1.041	1.041	\$11,157	<b>A1</b>	
US 36, Sher - Wads	8	95,10878	A	AC%	\$23.40	<b>29</b> .1	29	0.22	4.6	0.02	82.1	0.997	0.967	(\$102)	A1	
US 36, Shor - Wada	ß	95,10678	A	Stab	\$23.40	29,1	29	1. <b>70</b>	40.0	7.10	100.0	1,050	1.050	\$1,701	<b>A</b> 1	
US 36, Sher - Wads	8	95, <b>1067</b> 8	A	VMA	\$23.40	29.1	29	0.37	13.6	0.69	91.9	1.032	1.029	\$4,354	A1	
US 38, Sher - Wads	8	95,10878	A	Voids	\$23.40	29.1	29	0.53	3.5	0.42	<b>9</b> 3,2	1,036	1.037	\$7,347	A1	
PROJECT GRADING	"C" TOT/	ALS & MEAU	S FOR I	TEM	\$23.40	29.1	NA	NA	NA	NA	93.4	1.036	1.033	\$24,457		
			1		ala di second	· · · · ·			a a an an an an			1	· · · ·	Y. 1. 1.	· · ·	
STA 0451-003									······				A			
Jct SH 50 - South	2	96,10791	A	Dn <b>s%</b>	\$26.00	72.8	146	0.88	94.0	0.02	<b>97</b> .7	1.041	1.057	\$30,992	K1	
Jct SH 50 - South	2	96,10791	A	AC%	\$28.00	72.3	73	0.20	5.7	-0.01	85.9	1.001	0.956	589	К1	
Jct SH 50 - South	2	<b>96,1079</b> 1	A	Stab	\$28.00	72.3	73	2.04	37.0	4.08	97.9	1.035	1.059	\$3,305	K1	
Jct SH 50 - South	2	96,10791	A	VMA	\$26.00	72.3	73	0.54	16.4	-0.42	92.5	1.002	1.013	\$587	К1	
Jct SH 50 - South	2	96,10791	A	Voids	\$28.00	72.\$	73	0.59	4.0	-0.36	91.9	1.008	1.007	\$3,533	к1	
PROJECT GRADING	Statement of the local division of the local	Contraction of the local division of the loc	S FOR I		526.00	723	NA	NA	NA	NA	94.4	1.020	1.029	\$38,505		
1. 1. 1. 1. 1.				1 4 100		¥		×1.		\$ **	in the	at a	X.	·		
IM 0252-279		and the second									~~~~					
Jct SH 85 - North	2	96,10942		Dns%	\$34.30	10.5	22	1.03	94.0	-94.00	45.8	0.750	0,750	(\$36,015)	হা	
Jct SH 85 - North	2	96 10942	в	Dns%	\$34.30	30.8	59	0.71	B4.0	-94.00	85.8	1.023	0.992	\$9,592	51	
PROJECT GRADING				_		41.3	81	0.79	94.0	-94.00	77.8	0.953	0.930	(\$26,423)		-
	0 1014					41.0	<b>.</b>	0.78	04.0	-04.00	1130	0.800	0.000	(020,420)	51	
Jct SH 85 - North	2	96,10942		ACN	\$34.30	10.5	45	0.08	4.8	-4.60	95.8	1.042	1.045	\$758	51	
	_				•	- • •	10									
Jot SH 85 - North	2	96,10942		AC%	\$34.30	30.8	30	0.20	4.8	-4,80	83.9	1.005	0.971	\$248	\$1 \$1	
PROJECT GRADING		3 & MEANS	FOR AC	<b>7</b> 6		41,3	40	0.17	4.7	-4.75	85.9	1.014	0.990	\$1,005	<b>S1</b>	
			_	-												
Jct SH 85 - North	2	96,10942		Stab	\$34.30	10.5	10	1.17	40.0	-40.00	100.0	1.050	1.045	\$900	S1	
Jot SH 85 - North	2	96,10942		Stab	\$34.30	30.8	30	2.76	40.0	-40.00	100.0	1.050	1.055	\$2,641	ទា	
PROJECT GRADING "	C" TOTAL	S & MEANS	FOR ST	ABILITY		41.3	40	2.36	40.0	-40.00	100.0	1.050	1.052	\$3,541	St	
Jct SH 85 - North	2	96,10942	A	VMA	\$34.30	10.5	10	0.33	14.0	-14.00	96.3	1.047	1.045	\$3,400	S1	
Jet SH 85 - North	2	96,10942	8	VMA	\$34.30	30.8	30	0.34	13.5	-13.50	100.0	1.050	1.055	\$10,584	<b>S</b> 1	
PROJECT GRADING "	C" TOTAL	S & MEANS	FOR VM	A		41.3	40	0.34	13.6	-13.63	99.6	1.049	1.052	\$13,984	<b>S1</b>	
Jet SH 85 - North	2	98,10942		Volds	\$34.30	10.5	10	0.37	4.0	-4.00	99.1	1.049	1.045	\$5,240	51	
Jct SH 85 - North	2	98,10942		Voids	\$34.90	30.8	30	0.58	3.5	-3.50	93.9	1.038	1.038	\$11,917	SI	
PROJECT GRADING "						41.3	40	0.53	3.8	-3.83	95.2	1.040	1.039	\$17,157	51	
PROJECT GRADING						41.3	NA	NA	NA	NA	89.0	1.007	0.997	\$9,245	SI.	
		. Y . Y	and a	7.0	* * *	and the second		A. 6.					-20-10-0-0-0-			
M 0704-179		u wa ka ka	distantion in	open and the second		a sinte	i ka	Aca	1 A		A	Same a		A	Acc	ň
170 Colfax - SH 26	6	98,11364	A	Dna%	\$29.15	1.2	3	0.35	94.0	-1.57	100.0	1. <b>05</b> 0	1.025	\$682	A1	s
											100.0 89.7	1.026				5
170 Colfax - SH 26	6	96,11364		Dne%	\$29.15	9.1 77 e	18	0.70	94.0	-1.15			1.023	\$2,770	A1	
70 Cottex - SH 26	8	98,11364			\$29.15	27.8	58	0.96	94.0	-1.83	58.9	0.641	0.729	(\$116,499)	<u>A1</u>	. 5
PROJECT GRADING "(	TOTAL	⇒ō Mean\$	FOR DE	¢7	\$29.15	38.1	77	0.88	94.0	-1,68	66.1	0.748	0.809	(\$113,045)	<b>A</b> 1	S
	8	96,11364	A	AC%	\$29.15	1.2	2	NA	5.0	-0.03	NA	1. <b>00</b> 0	1.000	\$0	<b>A1</b>	S
70 Colfax - SH 28		96,11364	B	AC%	\$29.15	9.1	9	0.28	5.1	-0,19	66.8	0.851	0.909	(\$3,957)	A1	S
70 Colfax - SH 28 70 Colfax - SH 26	6					27.8	28	0.15	4.3	0.09	91.8	1.027	1.029	\$2,190	A!	8
	-	96,11364	С	AC%	<b>\$2</b> 9.15	A7.00										
70 Colfaur - SH 26	6	96,11364	-		\$29.15 \$29,15	38.1	39	0.18	4.5	0.03	85.6	0.984	0.999	(\$1,788)	<b>A1</b>	5
70 Colfax - SH 26 70 Colfax - SH 26	6 TOTALS	96,11364	FOR ACI	6			39 NA	0.18 NA	4.5 NA	0.03 NA	85.B NA	0.984 NA	0.999 NA	(\$1,788) NA	A1 A1	-
70 Colfair - SH 26 170 Colfair - SH 26 PROJECT GRADING 10	6 TOTALS	96,11364 5 & MEANS	FOR ACI	Stab	<b>\$2</b> 9,15	38.1								-		s
70 Colfax - SH 26 70 Colfax - SH 26 PROJECT GRADING *C 70 Colfax - SH 26	6 * TOTALS 6 8	96,11364 5 & MEANS 96,11364	FOR ACI	Stab Stab	\$29.15 \$29.15	38.1 NA	NA	NA	NA	NA	NA	NA	NA	NA	<b>A</b> 1	s s s

Table 1
HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY PROJECT
AND MIX DESIGN FOR 1993 - 96 VOID ACCEPTANCE PROJECTS

PROJECT	RG	YR COM,	PRC	ELE-	BID \$/	TONS	TEST	PRO	CESS	MEAN	QUAL	VA	QPM2	VA	CNT	
LOCATION	#	SUBAC #	#	MENT	TON	1000	°n*	SD	TARG	- 7AR	LEVI.	PF	PF	VD\$	CDE	G
170 Colfax - SH 26	6	96,11364	٨	VMA	\$29.15	1.2	2	NA	13.0	0.00	NA	1.000	1.000	\$0	A1	
170 Colfax - SH 28	8	96,11364	9	VMA	\$29.15	8.1	9	0.51	13.0	-0.82	100.0	0.833	1.040	(\$8,895)	A1	
170 Colfax - SH 28	6	96,11364	С	VMA	\$29.15	27.8	28	0.40	13.2	-0.83	82,3	1.014	0.966	\$2,237	A1	
PROJECT GRADING "		LS & MEANS	FORV	MA	\$29.15	38.1	30	0.43	19.1	-0.80	88.7	0.970	0.986	(\$6,658)	A1	
170 Colfax - SH 26	6	96,11364	A	Voids	\$29.15	1.2	2	NA	4.0	-1.25	NĂ	0,778	0.669	(\$2,269)	A1	
170 Coltax - SH 26	6	96,11364	B	Voids	\$29.15	9.1	9	0.61	4.0	-1.55	29.2	0.833	0.561	(\$13,342)	A1	
170 Colfax - SH 26	6	96,11364	c	Voida	\$29.15	27.8	28	0.43	4.1	-0.35	96.8	1.049	1.050	\$11,961	AT	
PROJECT GRADING TO			_		\$29,15	38.1	39	0.48	4.1	-0.67	81.6	0.989	0.928	(\$3,651)	A1	_
PROJECT GRADING					\$29.15	38.1	NA	NA NA	NA	-0.67 NA	50,4	0.589	0.578		A1 A1	• _
		LO C REAL		11000 11000				- W	and the state of the		and a second			(\$12,077)		
		North Mar. Jan.		Warnen Stor	. n. Ann .	Anostron	Mamid	X	N	Arment.	Alle A.	with the	A	A. 180000 A	Acro	
IM 0292 - 293 Northgata - North	6	96,11373		Dns%	\$38.75	21.1	43	1.23	94.0	0.17	89.5	1.025	1,001	\$8,177	W2	
Notungana - North	0	89,11373	^	LATE M	930.73	<b>Z</b> 1. ł	40	1.20	94.U	0.17	08.9	1.020	1,001	90,177	VV2	
Northgats - North	6	96,11373	A	AC%	<b>\$38</b> .75	21.1	21	0.17	5.1	-0.08	88.6	1.002	1.009	<b>\$18</b> 6	W2	
Northgate - North	6	96,11373	A	Steb	\$38.75	NA	NA	NA	NA	NA	NA	NA	NA	<b>\$</b> D	W2	
Northgate - North	6	96,11373	A	VMA	\$38.75	21.1	21	0.41	13.0	-0.38	<b>98,1</b>	1.021	1.050	<b>\$</b> 3,485	₩2	
Northgate - North	6	96,11373	A	Voida	\$38.75	21.1	21	0.57	4.5	-1.44	91.0	1.003	1.024	\$738	₩2	;
PROJ GRADING "SMAT	" TOTA	LS & MEANS	S FOR I	TEM	\$38.75	21.1	NA	NA	NA	NA	91.6	1.015	1.018	\$12,584	W2	
Contraction of the second s	a 11'		1. 19	×			8. · · · · · · · · · · · · · · · · · · ·	• 3		×		Sinte ac	1 12	. Sind .	. inter	
HB 0703-234																
170, Colfax - Cir Crk	8	96,11512	A	Dra%	\$31.40	3.5	8	0.17	94.0	-1.93	66.4	0.908	0.905	(\$4,104)	A1	8
170, Colfax - Cir Crk	8	96,11512	8	Dna%	\$31.40	21.3	43	0.61	94.0	-1.27	88.4	1.021	0.992	\$5,627	A1	\$
PROJECT GRADING "C	TOTAL	S&MEANS	FOR DE	ENS	\$31.40	24.8	51	0.55	94.0	-1.36	85.3	1.005	0.980	\$1,523	<b>A</b> 1	5
170, Colfax - Ctr Crk	6	98,11512	A	AC%	\$31.40	3.5	4	0.10	4.9	0.03	100.0	1.049	1,030	\$535	<b>A1</b>	\$
170, Colfax - Cir Crk	6	96,11512	8	AC%	\$31.40	21.5	22	0.17	4.0	0.27	<b>56.9</b>	0.845	0.766	(\$10,362)	A1	8
PROJECT GRADING "C"	TOTAL	S&MEANS	FOR AC	**	\$31,40	24.8	26	0.18	4.9	0.24	62.9	0.874	0.803	(\$9,827)	A1	5
170, Colfax - Cir Crk	6	96,11512	A	Stab	\$31.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	A1	\$
170, Colfax - Cir Crk	8	96,11512	8	Stab	\$31.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	A1	8
NOT APPLICABLE ON T	HIS PRO	DJECT			\$31.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	A1	ş
170, Colfax - Cir Crk	6	98,11512	A	VMA	\$31.40	3.5	4	D.47	14.0	-0.03	100.0	1.049	1.030	\$1,070	A1	5
70, Colfax - Cir Cirk	6	98,11512	B	VMA	\$31.40	21.3	22	0.67	14.0	0.30	90.9	1.031	1.023	\$4,113	A1	5
PROJECT GRADING "C"	TOTAL	s & Means I	FOR VM	IA	\$31.40	24.8	28	0.64	14.0	0.25	92.2	1.093	1.024	\$5,182	A1	s
70, Colfax - Cir Cok	8	96,11512	A	Voids	\$31.40	3.5	4	0.79	3.8	-0.35	94.1	1.046	1.030	\$1,506	A1	s
70, Colfax - Cir Crk	6	96,11512	B	Voids	\$31.40	21.3	22	0.76	3.8	-0.78	78.5	0.924	0.942	(\$15,332)	A1	5
	TOTAL			(De	\$31.40	24.8	28	0.78	3.8	-0.72	80.7	0.941	0.954	(\$13,828)	A1	S
PROJECT GRADING "C"	IOIAG	O & MEANS F	UR VU	00	931.4U	204,0	14	4.74	0.0	~~~~				[010,020)		
PROJECT GRADING "C" PROJECT GRADING "C"	·		<u> </u>		\$31.40	24.8	NA	NA	NA	NA	83.1	0.978	0.963	(\$10,945)	A1	9

LOCATION:         Table Head         Table He	PROJECT	RG	YR COM.	PRC			TONS	TES		DCESS	MEAN	QUAL	VA	QPM2		CNT	AGG
Bit May         Number Her         6         Bit States         A         A         A         States         State         St				-		1 +-	1					-		-	· ·	1	
mb         mb<	LOOATION	1 11	SUBAU #		Iment	110M	1 1000			TARG	1.144	LEAL			T ND 9	TODE	IGIOD
Harder Ha, Nie S         2         44,247         N         5.3         0.40         0.200 <th0.200< th=""> <th< td=""><td>hi man</td><td>8m</td><td></td><td>-</td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<></th0.200<>	hi man	8m		-			-										
List Hirds, Nik S         2         44,240         6 / 21,50         8 / 5         6 / 17         6 / 1         6 / 1         6 / 1         6 / 1         6 / 1         7 / 1         7 / 1         7 / 2 <td></td> <td>-</td> <td>•</td> <td></td> <td></td> <td></td> <td>-</td> <td></td>		-	•				-										
Heisen Nass       2       44.2010       B       ACK       51:00       34       51       61:4       71.7       0.862       0.862       94.0       W2       C         Alter Hall, N.S.       2       44.2010       D       ACK       521.00       34       53       6116       53       0.044       70.3       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5017       1000       5007       1000       1000       1000	• •		•			•									• • • •		
List Hit S, N & S         2         ALCOLOR         CTUD         ALS         S         Diff         List         No         List         List <thlist< th=""></thlist<>	-		-														
Lissen Key, Na S.         2         Alegord         D         Alegord         Alegord         Alegord         S.3         Out         F.3         Out         F.3         Out         F.3         Out         F.3         Out         F.3         Out         F.3         F.3         Out         F.3         F.	Jet SH 165, N & S		94,92410		AC%	\$21.90	8.5	₽			0.14	81,7	0.995	0.995	(\$44)	W2	С
Jule 3H 161 No.5         2         94,02410         A         ACK         1222         144         5         103         5.4         -000         1020         1030	Jct SH 165, N & S		-	-	AC%	\$21,90		3	0.23	5.3	0.14	70.3	1.007	1.002	\$26	W2	
Lei Hei Nie Sin A.S.       2       44,0010       C       ACK       522,00       100       100       100       100       100       100       1000 <td>Jct SH 165, N &amp; S</td> <td>2</td> <td>94,92410</td> <td>D</td> <td>AC%</td> <td>\$21.90</td> <td>4.5</td> <td>5</td> <td>0.18</td> <td>5.3</td> <td>0.04</td> <td><b>94</b>.5</td> <td>1.045</td> <td>1.030</td> <td>\$217</td> <td>W2</td> <td>С</td>	Jct SH 165, N & S	2	94,92410	D	AC%	\$21.90	4.5	5	0.18	5.3	0.04	<b>94</b> .5	1.045	1.030	\$217	W2	С
ub       State       9       94/2010       C       ACX       \$22.00       2.4.4       4       101       5.5       -0.00       10.00	Jat SH 165, N & S	2	94,92410	A	AC%	\$28.20	4.4	5	0.13	5,4	-0.08	99.0	1.050	1.030	\$315	W2	CX
cl-sel-sel-sel-sel-sel-sel-sel-sel-sel-se	Jct SH 165, N & S	2	94,92410	8	AC%	\$28.20	10.0	10	0.18	5.1	-0.02	<b>91</b> ,7	1.032	1.037	\$447	W2	CX
Heid High N & B         2         94 (2010)         E         ACN         2020         147         15         0.11         6.5         -0.05         80.3         1.020         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.025         1.021         0.026         0.026         0.026	Jot SH 165, N & S	2	94,92410	С	AC%	\$28.20	4.4	4	0.13	5.5	-0.09	100.0	1.049	1.030	\$303	W2	CX
Pieres-Nam         2         95/2022         A         A/S         92.00         21.2         12.0         015         4.6         02.00         87.2         12.00         10.00         94.26         K1         C           Pieres-Nam         2         96/5226         B         A/CK         \$53.00         72.3         173         0.15         6.6         40.00         85.9         1.000         5428         K1         C           36.8         Mich Views         2         86(10701         A         A/CK         \$53.00         72.3         173         0.20         6.7         0.00         85.9         1.000         5.971         \$22.8         81         C           Cold State State         0         State State         3.00         3.00         3.00         2.0         4.6         0.017         6.00         8.00         5.1         4.1         State         1.001         5.00         5.0         A/L         State         5.0         0.00         NA         1.002         5.0         A/L         State         5.0         0.00         NA         1.002         1.001         1.002         1.001         1.001         1.002         1.002         1.002         1.002	Jct SH 165, N & S	2	94,92410	D	AC%	\$28.20	21.4	21	0.16	5.1	-0.04	93.2	1.036	1.032	\$1,084	W2	СХ
Phene-Num         2         Science         A         A         Science	Jct SH 165, N & S	2	94,92410	ε	ACM	\$28.20	14.7	15	0.11	5.5	-0.05	89.3	1,049	1.050	\$1,018	W2	cx
US 38, Sine-, Wurds       6       95, 50, 50, 72, 3       73       0.22       4.5       0.22       1.0       0.857       0.967       0.857       0.851       0.501       0.853       0.55       0.511       0.853       0.55       0.851       0.851       0.851       0.853       0.55       0.851       0.851       0.851       0.851       0.851       0.853       0.55       0.851       0.853       0.55       0.851       0.853       0.55       0.851       0.853       0.55       0.851       0.853       0.55       0.851       0.853       0.55       0.851       0.852       1.152       0.852       1.152       0.852       1.152       0.852       1.152       0.855       1.152       0.855       0.855       0.855       0.855       0.855       0.855       0.855       0.855       0.855       0.855       0.855       0.855       0.855	Pierce - Nunn	2	95,93262	A	ACM	\$25.00	22.4	23	Q.18	4.8	0.06	87.2	1.022	0,999	\$803	K1	C
Jed BH 55 - Namb       2       64 (10791       A       ACM       S2000       7.2       7.3       0.20       5.7       0.01       85.8       1.042       0.05       57.8       51       C         Jett BH 55 - Namb       2       08 (10942)       A       ACM       533.40       10.65       10       0.02       4.4       -0.01       85.9       1.002       0.07       52.44       C         CommoSTE OF VD ACCEPTANCE ACTESTS       Excell       313.8       316       0.19       5.1       -0.01       85.9       1.000       0.00       5.77       \$1,444         TOCOMENSITE OF VD ACCEPTANCE ACTESTS       Excell       313.8       18       0.10       0.00       85.9       1.000       0.00       5.9       1.1       S2         T/7C Caffue: SH 28       6       8,11514       A       ACK       531.47       2.1       2.2       NA       6.0       0.03       7.8       0.65       0.02       1.000       0.00       51.0       1.02       52.10       A1       S2       S2       NA       NA       1.000       1.000       1.000       1.000       1.000       1.000       1.000       1.000       1.000       1.000       1.000       1.000	Pierce - Nunn	2	95,93262	в	ACM	\$33.00	12.8	13	0.15	5.0	-0.06	<b>B3</b> .3	1.020	1.040	\$428	K1	С
Jet BH 85. Horth         2         86,10842         A         ACM         \$384.20         10.5         10         0.08         4.8         -0.17         65.8         1.042         1.045         5778         51.         C           ComPOSITE OF VID ACCEPTINCE CETERTS         E20.49         316         0.10         6.11         -0.01         8.13         1.000         1.007         81.44         1.000         50.77         \$1.444           TO ComPOSITE OF VID ACCEPTINCE CETERTS         E20.49         316         0.10         6.01         6.01         6.01         6.01         6.01         0.00         50.0         0.00         50.0         6.01         0.00         50.0         0.00         50.0         6.01         0.00         50.0         6.01         0.00         50.0         51.0         0.00         50.0         51.0         0.00         50.0         51.0         0.00         50.0         51.0         51.0         50.0         51.0         0.00         50.0         51.0         50.0         51.0         50.0         51.0         50.0         51.0         50.0         51.0         50.0         51.0         50.0         51.0         50.0         51.0         50.0         50.0         51.0	US 38, Sher - Wads	6	95,10678	A	AC%	\$23.40	29.1	29	0.22	4.6	0.02	82.1	0.997	0.967	(5102)	At	С
bit BM 85 - North         2         MC10942         B         ACN         \$34.50         30.6         30         0.20         4.8         -0.00         83.9         1.005         0.071         1.248         91         C           COMPOSITE OF VID ACCEPTANCE ACTESTS         LSAM         410         5.1         -0.01         89.3         1.000         0.077         31,444         Site         Site         1.000         0.077         31,444           TO CAMES - SH 28         6         8,11394         A         ACN         \$28.15         1.2         2         NA         6.00         1.000         0.007         \$21.00         1.5         Site         No.13         Site         No.25         Site         0.13         NA         1.000         1.000         5.07         1.5         Site         0.13         NA         1.000	Jct SH 50 - South	2	96,10791	A	ACT	\$26.00	72.3	73	0.20	5.7	-0.01	85.9	1.001	0.956	\$89	K1	С
COMPORTE OF VD ACCEPTANCE ACTESTS         \$23.94         910.3         316         0.16         6.1         0.07         98.3         1.000         0.977         \$1,444           DESIGNED BY TEXAS OVATORY, WTED AVERACIES & TOTALS         Anadata Mean-Target         0.08         NA         1.000         1.000         1.000         1.000         500         A1         SP           170 Cohts, SH 28         6         81,194         A         ACK         523.15         A1         6         0.02         51         0.00         61.000         (51.000         51.000         51.000         51.000         51.000         51.06         61.032         1.01         51.000         51.000         51.06         61.032         1.02         51.00         1.000         51.06         61.032         1.02         51.00<	Jct SH 85 - North	2	96,10942	<b>A</b> .	AC%	\$34.30	10.5	10	0.08	4.6	-0.17	95.8	1.042	1.045	\$756	\$1	с
Description         Description         State	Jct SH 85 - North	2	96,10942	8	AC%	\$34.30	30.8	30	0.20	4.8	-0.08	83.9	1.005	0.971	\$248	<b>91</b>	с
DESIGNED BY TEQAS OYRATORY, WTED AVERAGES & TOTALS         Abanchas Mesm-Target         0.00           172 Codmic - SH 28         6         96,11984         A         ACN         \$22,615         1.2         2         NA         5.0         -0.03         NA         1.000         1.000         \$80         A1         \$5°           170 Cohne: SH 28         6         96,11984         C         ACN         \$22,15         7.8         \$5°           170 Cohne: SH 28         8         96,11972         A         ACN         \$52,15         7.1         27         1.020         8.8.8         1.000         1.008         \$108         V.209         \$10.9         1.028         \$21,100         A1         \$5°           170 Cohne: Chr CA:         8         96,11512         A         ACN         \$51,40         3.5         4         0.10         4.9         0.03         1000         1.048         1.080         \$538         \$1         \$20,07         \$40         0.07         \$40         0.08         1.081         \$20,07         \$1,00         1.081         \$21,00         \$23,07         \$24,07         \$24,07         \$24,07         \$24,07         \$24,07         \$24,07         \$24,0         \$28,08         \$27,0 <t< td=""><td></td><td>CEPTAN</td><td></td><td>3</td><td>'</td><td>\$26.94</td><td>310.3</td><td>318</td><td>0.19</td><td></td><td></td><td>88.3</td><td></td><td></td><td></td><td></td><td>_</td></t<>		CEPTAN		3	'	\$26.94	310.3	318	0.19			88.3					_
170 Cotter- 6H 28       8       9611594       A       ACM       \$2215       1.2       2       NA       6.0       -0.03       NA       1.000       1.000       \$80       A1       SP         170 Cotter- 5H 28       6       9611594       C       ACM       \$2215       £1       8       0.221       51       3.0       0.68       0.551       0.202       \$210       A1       SP         170 Cotter- 5H 28       6       9611512       A       ACM       \$358.75       21.1       21       0.17       4.8       0.027       56.8       0.028       1.002       \$536.6       NH       SP         170, Cotter- Cric 6       9611512       A       ACM       \$538.75       21.1       21       0.17       4.8       0.03       1000       1.040       1.030       \$535.6       A1       SP         170, Cotter- Cric 6       9611512       A       ACM       \$35.222       44.0       80       0.07       7.8       0.664       0.027       (\$11.407)       \$52.50       0.07       2.017       4.00       0.07       \$24.01       \$11.407)       \$22.07       34.3       40.0       0.76       64.3       1.035       \$10.90       \$10.90 <t< td=""><td></td><td></td><td></td><td>-</td><td>SATOT</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>.,</td><td></td><td>41,464</td><td></td><td></td></t<>				-	SATOT								.,		41,464		
170 Collmar-SH 28       8       96,11384       B       ACM       \$22,15       8.1       9       0.28       5.1       -0.13       96.8       0.851       0.025       (33,957)       A1       SP         170 Collmar-SH 28       8       96,11384       C       ACM       \$22,15       21       21       17       1.026       1.026       \$10.98       1.026       \$10.98       \$10.98       1.026       \$10.98						· · - ;	1.2			-		NA	1.000	1,000	<u>¢n</u>	A1	se
170 Conflax: SH 28       8       98,11373       A       ACM       \$29,15       27,8       28       0.15       4.3       0.00       91,8       1.027       1.020       \$21,190       A1       SP         Nortigate-North       8       98,11572       A       ACM       \$38,167       21,3       22       0.17       4.8       0.00       10.46       10.60       5756       A1       SP         170, Collex-CirCrk       8       B4,11512       A       ACM       \$31,40       3.5       4       0.10       4.8       0.06       10.80       10.80       \$5356       A1       SP         COMPOSITE OF VACCEPTANCE       XEXED       S23.07       94.3       40.0       0.17       4.8       0.06       70.8       0.656       0.944       (\$11,400)       SP         COMPOSITE OF VALCEPTANCE       S23.07       94.3       402.0       0.18       0.07       44.3       0.067       0.89       0.970       611.951         ALEL AC CONTRANCE       S24.07       A       Darks       \$21.60       1.5       1.7       1.1       4.8       0.067       0.07       611.951         ALEL AC CONTRANCE       SEVEND       A       Darks       \$21.60			,														
Northgata         Northgata <t< td=""><td></td><td></td><td>•</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>			•														
I 70, Collex- Cr Crk.       6       96,11512       B       A/K       \$31.40       21.3       22       0.17       4.8       0.27       58.9       0.645       0.766       (\$10,362)       A1       SP         170, Collex- Cr Crk.       8       0.511512       A       A/K       \$31.40       21.3       22       0.17       4.8       0.00       78.6       0.685       0.764       8.9       0.685       0.77       4.8       0.00       78.6       0.685       0.77       8.9       0.685       0.77       8.9       0.685       0.77       8.9       0.685       0.77       8.9       0.685       0.77       8.0       0.77       8.05       0.641       0.108       1.000       1.049       1.020       1.9       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       0.77       8.13       1.026       0.77       8.13       1.026       0.77       8.14		-	•			-		-							-		
170, Collex- Cir Crk.       9 84,11512       A       ACN       \$31,40       3.5       4       0.10       4.8       0.00       1.046       1.030       5535       A1       SP         COMPOSITE OF VD ACCETTANCE AC TESTS       \$32,22       84.0       86       0.17       4.8       0.00       1.046       1.030       6.957       0.944       (\$11,409)       SP         COMPOSITE OF VD ACCEPTANCE       \$22,07       94.3       402.0       0.18       5.07       0.00       84.9       0.970       (\$11,951)       Associate Mean-Target       0.07       (\$11,951)       C       C       C       C	-		-			-											
COMPOSITE OF VD ACCEPTANCE AC TESTS         \$22.23         84.0         86         0.17         4.8         0.06         78.8         0.856         0.944         (\$11,400)         SP           DESIGNED BY SUPERAVEL WEGHTED AVERACES & TOTALS         52.00         1.10         0.018         5.00         0.00         84.9         0.017         0.00         84.9         0.017         0.00         84.9         0.017         0.00         84.9         0.017         0.00         84.9         0.017         0.00         84.9         0.017         0.00         0.07         0.01         0.017         0.01         0.017         0.01         0.017         0.00         0.017         0.01         0.017         0.00         0.017         0.01         0.011         0.011         0.011         0.011         0.011         0.011         0.011         0.011         0.011         0.011         0.011         0.011         0.011         0.011 </td <td>•</td> <td>-</td> <td>•</td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td>• • •</td> <td></td> <td></td>	•	-	•			-						-			• • •		
DEBICINED BY SUPERPAVE, WEGHTED AVERAGES & TOTALS         Absolute Mean-Target         0.13           COMPOSITE OF ALL VOID ACCEPTANCE         \$22.07         384.3         4C20         0.18         5.07         0.00         84.9         0.891         0.891         0.891         0.891         0.891         0.891         0.891         0.891         0.891         0.891         0.891         0.891         0.891         0.891         0.891         0.895         \$1,080         VC         C           C01 Aver, Week-Fiel         6         65,80022         A         Dmit%         \$22,190         3.5         0.13         400         0.861         1.005         \$30,839         V/2         C           dct SH 165, N & S         2         94,62410         A         Dmit%         \$21,80         3.5         17         11.1         94.0         -0.44         94.1         1.005         0.500         \$986         W2         C           Lit SH 165, N & S         2         94,62410         D         Dmit%         \$21,80         4.5         9         1.45         9.40         -0.57         10.00         1.055         81,083         W2         C           Lit SH 165, N & S         2         94,62410         D		_		_	ACR							_				AL	
DOMPOSITE OF ALL VOID ACCEPTANCE         220.07         SH4.3         402.0         0.18         5.07         0.00         84.9         0.891         0.897         0.891           PELD AC CONTENT TESTS, WEIGHTED AVERAGES & TOTULS         Abcolute Meen-Target         0.07         0.00         84.9         0.891         0.097         (\$11,851)           PELD AC CONTENT TESTS, WEIGHTED AVERAGES & TOTULS         Abcolute Meen-Target         0.07         0.07         0.01         0.05         58,058         W2         C           drt SH 165, N & S         2         94,02410         A         Dme% \$21.90         85.5         80         1.12         84.0         1.005         0.898         98.988         W2         C           dct SH 165, N & S         2         94,02410         A         Dme% \$21.90         3.4         7         0.63         44.0         9.101         94.0         -0.44         94.7         1.040         1.005         \$10.98         W2         C           dct SH 165, N & S         2         94,02410         D         Dme% \$22.20         4.4         9         1.45         94.0         -1.11         94.4         1.007         1.040         1.049         1.049         1.049         1.049         1.049 <td< td=""><td></td><td></td><td></td><td>- I</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>79.0</td><td>0.836</td><td>0.844</td><td>(311,408)</td><td></td><td>58</td></td<>				- I								79.0	0.836	0.844	(311,408)		58
PELD AC CONTENT TESTS, WEDGHTED AVERAGES & TOTALS         Absolute Mean-Target         0.07           6th Ave, Wards-Fed         6         63,80002         A         Dws%         \$20.25         21.1         42         0.79         94.0         -0.76         94.3         1.035         \$39,830         W2         C           6th Ave, Wards-Fed         6         63,80002         A         Dws%         \$22.90         3.6         50         1.12         84.0         1.005         \$39,830         W2         C           Jet SH 165, N & S         2         94,82410         A1         Dws%         \$21.90         8.5         17         1.11         94.0         -0.86         84.0         1.005         \$1.006         1.005         1.005         \$1.006         W2         C           Jet SH 165, N & S         2         94,82410         D         Dws%         \$21.90         4.5         9         1.01         94.0         -0.44         94.7         1.040         1.040         \$1.058         \$1.068         W2         C           Jet SH 165, N & S         2         94,82410         D         Dws%         \$28.20         1.44         9         1.45         94.0         -1.50         62.4         0.771										· · · ·	-		0.004				
Grin Avec, Wards-Field         6         63,96062         A         Dmath         \$226.25         21.1         42         0.79         94.0         -0.76         94.3         1.005         \$39,839         W2         C           Jet SH 165, N & S         2         94,82410         A         Dmark         \$21,90         36.5         80         1.12         94.0         AA         1.005         0.339         \$1,886         W2         C           Jet SH 165, N & S         2         94,82410         B         Dmark         \$21,90         3.4         7         0.53         94.0         1.41         94.0         1.42         7.4         0.890         0.861         (\$1,469)         W2         C           Jet SH 165, N & S         2         94,82410         A         Dmark         \$22,120         4.5         9         1.01         84.0         0.100         1.035         \$1,036         W2         C           Jet SH 165, N & S         2         94,82410         A         Dmark         \$22,20         4.4         9         1.45         94.0         0.11         84.4         0.677         \$11,128         W2         CX           Jet SH 165, N & S         2         94,82410					0 70741							04.9	0.991	0.870	(3) 1,801)		
Off-Ave, Wrede-Fed         6         53,8002         A         Dreft         \$22,25         21.1         42         0.79         94.0         -0.75         94.3         1.056         1.055         \$39,83         W2         C           Jet SH 165, N & S         2         94,82410         A1         Dreft         \$21,90         38.5         60         1.12         94.0         -0.86         64.0         1.005         0.839         \$1,896         W2         C           Jet SH 165, N & S         2         94,82410         C         Dreft         \$21,90         3.4         7         0.53         94.0         -0.05         1.005         0.263         (81,469)         W2         C           Jet SH 165, N & S         2         94,82410         C         Dreft         \$21,90         3.4         7         0.53         94.0         0.11         84.4         9.1.00         1.035         1.035         \$1,036         W2         C           Jet SH 165, N & S         2         94,62410         D         Dreft         \$28.20         1.4         8         1.51         94.0         -0.44         85.3         0.9689         (52.778)         W2         CX           Jet SH 165, N & S </td <td></td> <td></td> <td></td> <td>RAGES</td> <td>&amp; IUIAL</td> <td>5 .</td> <td></td> <td>ADEOIUT</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>··· · ··</td> <td>2. 4. 64</td> <td>. 100</td> <td>ic and</td>				RAGES	& IUIAL	5 .		ADEOIUT						··· · ··	2. 4. 64	. 100	ic and
Jet SH 165, N & S       2       94,02410       A       Dms%       \$21,90       38.5       80       1.12       94.0       -0.86       94.0       1.005       0.299       \$1,969       W2       C         Jet SH 165, N & S       2       94,62410       A1       Dms%       \$21,90       1.5       NA       NA       94.0       NA       NA       1.12       78.4       0.690       0.691       \$(51,690)       W2       C         Jet SH 165, N & S       2       94,62410       D       Dms%       \$21.90       4.5       9       1.01       94.0       -0.44       94.7       1.040       1.040       \$1,590       W2       C         Jet SH 165, N & S       2       94,62410       A       Dms%       \$22.80       4.4       9       1.45       94.0       -0.44       94.7       1.040       1.040       \$1,590       W2       CX         Jet SH 165, N & S       2       94,62410       D       Dms%       \$28.20       1.4       8       1.35       94.0       -0.44       85.3       0.986       0.959       (52,776)       W2       CX         Jet SH 165, N & S       2       94,62410       D       Dms%       \$28.20       <	minner a houstand and	ani ma								A Denning		Time a.	mit main		attenned by a		e
Jet SH 165, N & S       2       94,82410       A1       Dne%       \$21,90       1.5       NA       NA       94,0       NA       NA       1.005       0.500       \$868       W2       C         Jet SH 165, N & S       2       94,82410       B       Dne%       \$21,90       3.4       7       0.53       64.0       -0.57       100.0       1.095       1.035       \$1,026       W2       C         Jet SH 165, N & S       2       94,62410       C       Dne%       \$21,80       3.4       7       0.53       64.0       -0.57       100.0       1.095       1.035       \$1,026       W2       C         Jet SH 165, N & S       2       94,62410       A       Dme%       \$28.20       1.44       9       1.45       94.0       -1.10       84.0       6.377       (\$11,128)       W2       CX         Jet SH 165, N & S       2       94,62410       B       Dme%       \$28.20       14.4       83       1.51       94.0       -1.25       74.8       0.680       0.696       62.777       (\$11,280       W2       CX         Jet SH 165, N & S       2       94,62410       E       Dme%       \$28.20       14.7       30 <t< td=""><td></td><td>-</td><td>•</td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>		-	•			-											
Jet SH 195, N & S       2       94,92410       B       Dms%       \$21,90       8.5       17       1.11       94.0       -1.12       78.4       0.690       0.661       (\$1,469)       W2       C         Jet SH 165, N & S       2       94,92410       C       Dms%       \$21,90       3.4       7       0.63       94.0       -0.57       100.0       1.035       \$1,056       W2       C         Jet SH 165, N & S       2       94,92410       A       Dms%       \$22.00       4.5       9       1.01       94.0       -0.41       1.040       1.040       \$1,500       W2       C         Jet SH 165, N & S       2       94,92410       A       Dms%       \$22.00       4.4       8       1.51       94.0       -1.50       62.4       0.771       0.877       (\$11,285)       W2       CX         Jet SH 165, N & S       2       94,92410       C       Dms%       \$28.20       14.4       8       1.51       94.0       -0.44       85.3       0.869       0.615       (\$16,94.2)       W2       CX         Jet SH 165, N & S       2       94,92410       C       Dms%       \$28.20       14.4       8       1.52       94.0	•		•						_								-
Jet SH 165, N & S       2       94,82410       C       Dmm%       \$21.90       3.4       7       0.63       94.0       -0.57       100.0       1.035       1.025       \$1,026       W2       C         Jet SH 165, N & S       2       94,82410       D       Dmm%       \$21.80       4.5       9       1.01       94.0       -0.44       94.7       1.040       1.040       \$1,500       W2       C         Jet SH 165, N & S       2       94,82410       B       Dmm%       \$28.20       1.00       20       1.30       94.0       -1.18       84.4       1.007       1.068       \$11.125)       W2       CX         Jet SH 165, N & S       2       94,92410       D       Dmm%       \$28.20       1.4       43       1.51       94.0       -0.44       85.3       0.968       0.969       (\$2,778)       W2       CX         Jet SH 165, N & S       2       94,92410       D       Dmm%       \$28.20       1.47       30       1.11       94.0       -1.25       74.9       0.806       0.615       (\$16,342)       W2       CX         Jet SH 165, N & S       2       94,92410       D       Dmm%       \$28.200       72.3       140 </td <td>•</td> <td></td> <td>•</td> <td>A1</td> <td>Dns%</td> <td>\$21.90</td> <td>1.5</td> <td>NA</td> <td>NA</td> <td>94.0</td> <td>NA</td> <td>NA</td> <td>1.005</td> <td>0.500</td> <td>\$66</td> <td>W2</td> <td>С</td>	•		•	A1	Dns%	\$21.90	1.5	NA	NA	94.0	NA	NA	1.005	0.500	\$66	W2	С
Jct SH 165, N & S       2       94,82410       D       Dms%       \$22,80       4.5       9       1.01       94.0       -0.44       94.7       1.040       1.040       \$1,560       W2       CX         Jct SH 165, N & S       2       94,82410       A       Dms%       \$28,20       4.4       9       1.45       94.0       0.11       84.4       1.007       1.040       \$1,040       \$1,020       \$23,500       W2       CX         Jct SH 165, N & S       2       94,82410       B       Dms%       \$28,20       4.4       8       1.51       94.0       -1.50       62.4       0.771       0.877       (\$11,228)       W2       CX         Jct SH 165, N & S       2       94,82410       E       Dms%       \$28,20       14.4       3       1.32       94.0       -1.25       74.9       0.890       0.915       (\$18,242)       W2       CX         Jct SH 165, N & S       2       94,82410       E       Dms%       \$28,20       14.47       30       1.11       94.0       -1.25       74.9       0.890       0.915       (\$18,242)       W2       CX         Jct SH 165, N & S       2       96,10278       A       Dms%       \$2	Jct SH 165, N & S	2	94,92410	8	Dna%	\$21.90	8.5	17	1.11	94.0	-1.12	78.4	0.980	0.961	(\$1,469)	W2	С
Jet SH 165, N & S       2       94,92410       A       Dms%       \$28.20       4.4       9       1.45       94.0       0.11       84.4       1.007       1.008       \$33.51       W2       CX         Jet SH 165, N & S       2       94,92410       C       Dms%       \$28.20       10.0       20       1.30       94.0       -1.30       70.0       0.901       0.877       (\$11,129)       W2       CX         Jet SH 165, N & S       2       94,92410       C       Dms%       \$28.20       14.4       8       1.51       94.0       -0.44       85.3       0.968       0.969       (\$2,770)       W2       CX         Jet SH 165, N & S       2       94,92410       E       Dms%       \$28.20       14.7       30       1.11       94.0       -1.25       74.0       0.869       0.9615       (\$16,242)       W2       CX         Jet SH 165, N & S       2       94,92410       E       Dms%       \$28.20       14.7       30       1.11       94.0       -1.25       74.0       0.809       0.912       0.901       (\$16,343)       K1       C         US 36, Sher-Wads       6       95,10791       A       Dms%       \$28.40	Jct SH 165, N & S	2	94,92410	C	Dna%	\$21.90	3.4	7	0.63	94.0	-0.57	100.0	1.035	1.035	\$1,039	W2	C
Jet SH 165, N & S       2       94,02410       B       Dms%       \$28,20       10.0       20       1.30       94.0       -1.30       70.0       0.801       0.877       (\$11,129)       W2       CX         Jet SH 165, N & S       2       94,02410       C       Dms%       \$28,20       4.4       8       1.51       94.0       -1.50       62.4       0.771       0.877       (\$11,129)       W2       CX         Jet SH 165, N & S       2       94,02410       D       Dms%       \$28,20       14.4       43       1.51       94.0       -0.44       85.3       0.988       0.986       (\$2778)       W2       CX         Jet SH 165, N & S       2       94,82410       E       Dms%       \$28.20       14.7       30       1.11       94.0       -125       74.9       0.890       0.915       (\$18.480)       K1       C         Pierce - Nunn       2       95,83262       A       Dms%       \$23.00       12.6       29       0.96       94.0       -0.138       73.9       0.912       0.901       (\$14.80)       K1       C         US 36, Sher - Wads       6       95,10678       A       Dms%       \$23.00       72.3       14	Jct SH 165, N & S	2	94,92410	D	Drus%	\$21.90	4.5	9	1.01	94.0	-0.44	94.7	1.040	1.040	\$1,580	₩2	С
Jet SH 165, N & S       2       94,02410       C       Dms%       \$28,20       4.4       8       1.51       94.0       -1.50       62.4       0.771       0.877       \$511,288       W2       CX         Jet SH 165, N & S       2       94,92410       D       Dms%       \$28,20       21.4       43       1.32       94.0       -0.44       85.3       0.968       0.969       \$52,778       W2       CX         Jet SH 165, N & S       2       94,92410       E       Dms%       \$28,20       14.7       30       1.11       94.0       -1.25       74.9       0.860       0.915       \$516,242       W2       CX         Pierce - Nunn       2       95,93262       A       Dms%       \$28,00       72.8       94.0       -0.53       95.2       1.041       \$11,157       K1       C         US 36, Sher- Wads       6       95,10761       A       Dms%       \$28,00       72.3       146       0.88       94.0       -0.53       95.2       1.041       1.041       \$11,157       A1       C         Jet SH 56 - South       2       96,10942       A       Dms%       \$24.00       72.5       1.04       0.46.0       -0.79       84.	Jet SH 185, N & S	2	94,92410	Α	Des%	\$28.20	4.4	9	1.45	94.0	0.11	84.4	1,007	1.008	\$351	W2	CX
Jct SH 165, N & S       2       94,92410       D       Dms%       \$228,20       21.4       43       1.32       94,0       -0.44       85.3       0.989       (\$2,775)       W2       CX         Jct SH 165, N & S       2       94,92410       E       Dms%       \$226,20       14.7       30       1.11       94.0       -1.25       74.9       0.890       0.915       (\$16,242)       W2       CX         Pierce - Nunn       2       95,93262       A       Dms%       \$25.00       22.4       39       1.22       94.0       -2.09       47.1       0.765       0.750       (\$52,674)       K1       C         W3 8, Sher - Wads       6       85,10678       A       Dms%       \$22.40       28.1       58       0.88       94.0       -0.33       95.2       1.041       1.041       \$11,157       A1       C         US 38, Sher - Wads       6       85,10678       A       Dms%       \$23.40       28.1       58       0.88       94.0       -0.21       45.8       0.750       (\$36,015)       51       C         Jct SH 35 - North       2       96,10942       A       Dms%       \$23.40       30.8       59       0.71       94.	Jct SH 165, N & S	2	94,92410	В	Draff.	\$28.20	10.0	20	1.30	84.0	-1.30	70.0	0.901	0.877	(\$11,129)	₩2	æ
Jet SH 165, N & S       2       64,62410       E       Dme%       \$26,20       14.7       30       1.11       94.0       -1.25       74.9       0.880       0.915       (\$18,242)       W2       CX         Pierce - Numn       2       95,93262       A       Dms%       \$25,00       22.4       39       1.22       94.0       -2.09       47.1       0.765       0.750       (\$52,674)       K1       C         US 36, Sher - Wads       6       65,10678       A       Dms%       \$22.40       20.1       58       0.88       94.0       -0.53       85.2       1.041       1.041       \$11,157       A1       C         US 36, Sher - Wads       6       65,10678       A       Dms%       \$22.600       72.3       144       0.88       94.0       0.02       97.7       1.041       1.057       \$30,692       K1       C         Jet SH 55 - North       2       96,10942       A       Dms%       \$28.40       10.5       2.1       45.8       0.750       0.750       0.750       0.562       \$31       C         COMPOSITE OF VD ACCEPT DENSITY TESTS       \$28.94       510.3       615       1.00       94.0       -1.57       100.0	Jct SH 165, N & S	2	94,92410	С	Dns%	\$25.20	4,4	8	1.51	94.0	-1.50	62.4	0.771	0.877	(\$11,288)	W2	CX
Pierce - Numn       2       95,93282       A       Dms%       \$25.00       22.4       39       1.22       94.0       -2.09       47.1       0.765       0.750       (\$52,674)       K1       C         Pierce - Numn       2       95,93282       B       Dms%       \$33,00       12.8       28       0.96       94.0       -1.38       73.9       0.912       0.901       (\$14,880)       K1       C         US 36, Sher - Wads       6       95,10678       A       Dms%       \$23.40       29.1       58       0.88       94.0       -0.53       95.2       1.041       1.041       \$11,157       A1       C         Jet SH 50 - South       2       96,10942       A       Dms%       \$23.00       72.3       146       0.88       94.0       -0.02       97.7       1.041       1.057       \$30,992       K1       C         Jet SH 50 - North       2       96,10942       B       Dms%       \$34.30       30.8       59       0.71       94.0       -2.11       45.8       0.750       (\$56,615)       S1       C         COMPOSITE OF VD ACCEPT DENSITY TESTS       \$28.94       310.3       615       1.00       94.0       -1.57       100.0<	Jct SH 165, N & S	2	94,92410	D	Dns%	\$28.20	21.4	43	1.32	94.0	-0.44	85.3	899.0	0.969	(\$2,778)	W2	СХ
Fierce - Num       2       95,83262       B       Dms%       \$33,00       12.8       28       0.96       94.0       -1.38       73.9       0.912       0.901       (\$14,880)       K1       C         US 36, Sher - Wads       6       95,10878       A       Dms%       \$22,40       29.1       56       0.88       94.0       -0.53       95.2       1.041       1.041       \$11,157       A1       C         Jct SH 50 - South       2       96,10942       A       Dms%       \$28.00       72.3       146       0.88       94.0       -0.23       95.2       1.041       1.057       \$30,992       K1       C         Jct SH 50 - South       2       96,10942       A       Dms%       \$34.30       10.5       22       1.03       94.0       -2.11       45.8       0.750       0.750       (\$36,015)       S1       C         Jct SH 25       North       2       96,10942       B       Dms%       \$34.30       30.8       59       0.71       94.0       -0.76       84.1       0.976       0.968       (\$52,303)         Lessigned BY TEXAS GYRATORY, WTED AVERAGES & TOTALS       \$10.03       1.025       \$10.02       \$1.025       \$6882       A1 </td <td>Jct SH 165, N &amp; S</td> <td>2</td> <td>94,82410</td> <td>Е</td> <td>Dns%</td> <td>\$28.20</td> <td>14.7</td> <td>30</td> <td>1.11</td> <td>94.0</td> <td>-1.25</td> <td>74.Đ</td> <td>0.890</td> <td>0.915</td> <td>(\$18,242)</td> <td>W2</td> <td>CX</td>	Jct SH 165, N & S	2	94,82410	Е	Dns%	\$28.20	14.7	30	1.11	94.0	-1.25	74.Đ	0.890	0.915	(\$18,242)	W2	CX
Pierce - Num       2       95,83282       B       Dms%       \$33,00       12.8       26       0.96       94.0       -1.38       73.9       0.912       0.901       (\$14,880)       K1       C         US 36, Sher - Wads       6       95,10678       A       Dms%       \$23,40       29.1       58       0.88       94.0       -0.53       95.2       1.041       1.041       \$11,157       A1       C         Jct SH 50 - South       2       98,10791       A       Dms%       \$28.00       72.3       146       0.88       94.0       -0.23       95.2       1.041       1.041       \$51,157       A1       C         Jct SH 56 - North       2       96,10942       A       Dms%       \$24.90       30.8       58       0.71       94.0       -2.11       45.8       0.750       0.750       (\$56,015)       S1       C         Jct SH 26       Pierter S       \$24.94       310.3       615       1.00       94.0       -0.79       84.1       0.976       0.988       (\$82,303)         Dest(SH 2B       FTEXAS GYRATORY, WTED AVERACES & TOTALS       \$100.3       6.01       -1.57       100.0       1.002       1.025       \$6882       A1       SP <td>Pierce - Nunn</td> <td>2</td> <td>95,93282</td> <td>Α</td> <td>Dns%</td> <td>\$25.00</td> <td>22.4</td> <td>39</td> <td>1.22</td> <td>94.0</td> <td>-2.09</td> <td>47.1</td> <td>0.765</td> <td>0.750</td> <td>(\$52,574)</td> <td>К1</td> <td>С</td>	Pierce - Nunn	2	95,93282	Α	Dns%	\$25.00	22.4	39	1.22	94.0	-2.09	47.1	0.765	0.750	(\$52,574)	К1	С
US 38, Sher - Wads       6       85,10878       A       Dms%       \$22,40       29,1       58       0,88       94,0       -0.53       95,2       1.041       1.041       \$11,157       A1       C         Jct SH 50 - South       2       98,10791       A       Dms%       \$28,00       72.3       146       0.88       94.0       0.02       97.7       1.041       1.057       \$30,992       K1       C         Jct SH 85 - North       2       98,10942       A       Dms%       \$34,30       10.5       22       1.03       94.0       -2.11       45.8       0.750       0.750       (\$36,015)       S1       C         Jct SH 85 - North       2       96,10942       B       Dms%       \$34.30       30.8       58       0.71       94.0       -0.78       84.1       0.978       0.986       (\$82,303)       C         COMPOSITE OF VD ACCEPT DENSITY TESTS       \$28.94       S10.3       615       1.00       94.0       -1.57       100.0       1.025       \$682       A1       SP         I70 Colfax - SH 28       6       96,11384       A       Dms%       \$29.15       27.8       56       0.96       94.0       -1.13       89.7 <td< td=""><td>Pierce - Nunn</td><td>2</td><td>95,93262</td><td>8</td><td>Dns%</td><td>\$33.00</td><td>12.8</td><td>26</td><td>0.96</td><td>94.0</td><td>-1.38</td><td>73.9</td><td>0.912</td><td>0.901</td><td></td><td>Kt</td><td>С</td></td<>	Pierce - Nunn	2	95,93262	8	Dns%	\$33.00	12.8	26	0.96	94.0	-1.38	73.9	0.912	0.901		Kt	С
Jet SH 50 - South       2       98,10791       A       Dne%       \$28,00       72.3       146       0.88       94.0       0.02       97.7       1.041       1.057       \$30,892       K1       C         Jet SH 85 - North       2       98,10791       A       Dne%       \$34.30       10.5       22       1.03       94.0       -2.11       45.8       0.750       (\$356,015)       \$1       C         Jet SH 85 - North       2       98,10942       B       Dne%       \$34.30       30.8       58       0.71       94.0       -1.14       88.8       1.023       0.992       \$9,682       \$1       C         COMPOSITE OF VD ACCEPT DENSITY TESTS       \$22.84       \$10.3       815       1.00       94.0       -0.79       84.1       0.976       0.986       (\$32,303)         DESIGNED BY TEXAS GYRATORY, WTED AVERAGES & TOTALS       Absolute Mean-Target       0.81       0.81       1.025       \$682       A1       \$P         170 Colfax - SH 28       6       96,11384       B       Dns%       \$29.15       9.1       18       0.70       94.0       -1.13       89.7       1.026       1.023       \$2,770       A1       \$P         170 Colfax - SH 28       <	US 36, Sher - Wads		95,10678	Α											•		
Jet \$H 85 - North       2       96,10942       A       Dms%       \$34.30       10.5       22       1.03       94.0       -2.11       45.8       0.750       (\$36,015)       \$1       C         Jet \$H 85 - North       2       96,10942       B       Dms%       \$34.30       30.8       59       0.71       94.0       -1.14       88.8       1.023       0.992       \$39,692       \$1       C         COMPOSITE OF VD ACCEPT DENSITY TESTS       \$22.94       \$10.3       815       1.00       94.0       -0.79       84.1       0.978       0.992       \$39,692       \$1       C         DESIGNED BY TEXAS GYRATORY, WTED AVERAGES & TOTALS       Absolute Mean-Target       0.81       0.978       0.9978       0.9968       (\$82,303)       10.5       1.2       3       0.35       94.0       -1.14       88.8       1.023       0.992       \$882       A1       \$P         I70 Colfax - SH 28       6       96,11384       B       Dms%       \$29.15       9.1       18       0.70       94.0       -1.13       89.7       1.025       \$882       A1       \$P         170 Colfax - SH 28       6       96,11384       B       Dms%       \$29.15       27.8       56	Jct SH 50 - South	2	96,10791														
Jet SH 85 - North       2       96,10942       B       Draft       \$34,30       30.8       59       0.71       94.0       -1.14       88.8       1.023       0.992       \$9,692       \$1       C         COMPOSITE OF VD ACCEPT DENSITY TESTS       \$26.94       \$10.3       815       1.00       94.0       -0.79       84.1       0.978       0.986       (\$82,303)         DESIGNED BY TEXAS GYRATORY, WTED AVERAGES & TOTALS       Absolute Mean-Target       0.81       0.81       0.978       0.986       (\$82,303)       (\$82,303)         170 Colfax - SH 28       6       96,11384       A       Draft       \$29,15       9.1       18       0.70       94.0       -1.57       100.0       1.025       \$682       A1       SP         170 Colfax - SH 28       6       96,11384       B       Draft       \$29,15       9.1       18       0.70       94.0       -1.13       89.7       1.028       1.023       \$2,770       A1       SP         170 Colfax - SH 28       6       96,11373       A       Draft       \$38.75       21.1       43       1.23       94.0       0.17       89.6       1.025       1.001       \$8,177       W2       SP         170, Coffax - Ci	Jct SH 85 - North		•														
COMPOSITE OF VD ACCEPT DENSITY TESTS       \$28.94       \$10.3       \$15       1.00       94.0       -0.79       84.1       0.978       0.986       (\$82,303)         DESIGNED BY TEXAS GYRATORY, W/TED AVERAGES & TOTALS       Absolute Mean-Target       0.81       0.81       0.81       0.81         170 Colfax - SH 28       6       96,11384       A       Dne% \$29.15       1.2       3       0.35       94.0       -1.57       100.0       1.025       \$682       A1       SP         170 Colfax - SH 28       6       96,11384       B       Dne% \$29.15       9.1       18       0.70       94.0       -1.13       89.7       1.026       1.025       \$2,770       A1       SP         170 Colfax - SH 28       6       96,11384       B       Dne% \$29.15       27.8       56       0.96       94.0       -1.83       56.9       0.641       0.729       (\$116,469)       A1       SP         170 Colfax - SH 26       6       96,11373       A       Dne% \$33.75       21.1       43       1.23       94.0       0.17       89.6       1.025       1.001       \$8,177       W2       SP         170, Colfax - Cir Cirk       8       96,11512       A       Dne% \$31.40       3.5																	
DESIGNED BY TEXAS GYRATORY, WTED AVERAGES & TOTALS         Absolute Mean-Target         0.81           170 Colfax - SH 28         6         96,11364         A         Dne% \$29.15         1.2         3         0.35         94.0         -1.57         100.0         1.025         \$682         A1         SP           170 Colfax - SH 28         6         96,11364         B         Dne% \$29.15         9.1         18         0.70         94.0         -1.57         100.0         1.025         \$2,770         A1         SP           170 Colfax - SH 26         6         96,11364         B         Dne% \$29.15         9.1         18         0.70         94.0         -1.13         89.7         1.026         1.025         \$2,770         A1         SP           170 Colfax - SH 26         6         96,11364         C         Dne% \$29.15         27.8         56         0.96         94.0         -1.83         56.9         0.641         0.729         \$116,469)         A1         SP           Northgate - North         6         96,11572         A         Dne% \$31.40         3.5         8         0.17         94.0         -1.93         88.4         1.021         0.992         \$5,627         A1         SP									_							- 1	-
170 Colfax - SH 28       6       96,11384       A       Dns% \$29.15       1.2       3       0.35       94.0       -1.57       100.0       1.025       \$682       A1       SP         170 Colfax - SH 28       6       96,11384       B       Dns% \$29.15       9.1       18       0.70       94.0       -1.57       100.0       1.025       \$682       A1       SP         170 Colfax - SH 28       6       96,11384       B       Dns% \$29.15       9.1       18       0.70       94.0       -1.13       88.7       1.028       1.023       \$2,770       A1       SP         170 Colfax - SH 26       6       96,11384       C       Dns% \$29.15       27.8       56       0.98       94.0       -1.83       56.9       0.641       0.729       (\$116,469)       A1       SP         Northgate - North       6       96,11573       A       Dns% \$31.40       3.5       8       0.17       94.0       -1.93       88.4       0.906       0.905       (\$4,104)       A1       SP         170, Colfax - Cir Crix       8       96,11512       B       Dns% \$31.40       3.5       8       0.17       94.0       -1.27       88.4       1.021       0.992								-						2.000	()		
170 Colfax - SH 28       6       96,11364       B       Dns%       \$29.15       9.1       18       0.70       94.0       -1.13       89.7       1.026       1.023       \$2,770       A1       SP         170 Colfax - SH 26       6       96,11364       C       Dns%       \$29.15       27.8       56       0.98       94.0       -1.83       56.9       0.641       0.729       (\$116,469)       A1       SP         Northgate - North       6       96,11373       A       Dns%       \$29.15       27.8       58       0.98       94.0       -1.83       56.9       0.641       0.729       (\$116,469)       A1       SP         170, Colfax - Cir Cit       6       96,11512       A       Dns%       \$31.40       3.5       8       0.17       94.0       -1.93       88.4       0.906       0.905       (\$4,104)       A1       SP         170, Colfax - Cir Cit       6       96,11512       B       Dns%       \$31.40       21.3       43       0.61       94.0       -1.27       88.4       1.021       0.992       \$55,627       A1       SP         170, Colfax - Cir Cit       6       96,11512       B       Dns%       \$31.40       21.3<			_									100.0	1.050	1.025	6697	<u>A1</u>	SP
170 Colfax - SH 26       6       96,11364       C       Dna%       \$29.15       27.6       56       0.96       94.0       -1.83       56.9       0.641       0.729       (\$116,469)       A1       SP         Northgate - North       6       96,11373       A       Dna%       \$38.75       21.1       43       1.23       94.0       0.17       89.6       1.025       1.001       \$8,177       W2       SP         170, Colfax - Cir Cik       6       96,11512       A       Dna%       \$31.40       3.5       8       0.17       94.0       -1.93       88.4       0.906       0.905       (\$4,104)       A1       SP         170, Colfax - Cir Cik       6       96,11512       B       Dna%       \$31.40       21.3       43       0.61       94.0       -1.27       88.4       1.021       0.992       \$5,627       A1       SP         COMPOSITE OF VD ACCPT DENSITY TESTS       \$32.23       84.0       171       0.87       94.0       -1.11       77.7       0.892       0.907       (\$103,348)       SP         DESIGNED EFY SUPERPAVE, WEIGHTED AVERAGES & TOTALS       Absolute Mean-Target       1.20       1.20       1.20       1.20       1.20       1.20 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td></td<>																	-
Northgate - North         6         96,11373         A         Dms%         \$38,75         21.1         43         1.23         94.0         0.17         88.6         1.025         1.001         \$8,177         W2         SP           170, Coffax - Cir Cirk         6         96,11512         A         Dms%         \$31.40         3.5         8         0.17         94.0         -1.93         88.4         0.906         0.905         (\$4,104)         A1         SP           170, Coffax - Cir Cirk         6         96,11512         B         Dms%         \$31.40         21.3         43         0.61         94.0         -1.93         88.4         0.906         0.905         (\$4,104)         A1         SP           170, Coffax - Cir Cirk         6         96,11512         B         Dms%         \$31.40         21.3         43         0.61         94.0         -1.27         88.4         1.021         0.992         \$55,627         A1         SP           COMPOSITE OF VD ACCPT DENSITY TESTS         \$32.23         84.0         171         0.87         94.0         -1.11         77.7         0.892         0.907         (\$103,348)         SP           DESIGNED BY SUPERPAVE, WEIGHTED AVERAGES & TOTALS         <																	
170, Coffax - Cir Citx       6       96,11512       A       Drastle       \$31.40       3.5       8       0.17       94.0       -1.93       98.4       0.906       0.905       (\$4,104)       A1       SP         170, Colfax - Cir Citx       6       96,11512       B       Drastle       \$31.40       21.3       43       0.61       94.0       -1.27       88.4       1.021       0.992       \$55,627       A1       SP         COMPOSITE OF VD ACCPT DENSITY TESTS       \$32.23       84.0       171       0.87       94.0       -1.11       77.7       0.892       0.907       (\$103,346)       SP         DESIGNED BY SUPERPAVE, WEIGHTED AVERAGES & TOTALS       Absolute Mean-Target       1.20			-												•		
170. Colfax - Cir Crk         6         96,11512         B         Drash         \$31.40         21.3         43         0.61         94.0         -1.27         88.4         1.021         0.992         \$55,627         A1         SP           COMPOSITE OF VD ACCPT DENSITY TESTS         \$32.23         84.0         171         0.87         94.0         -1.11         77.7         0.892         0.907         (\$103,346)         SP           DESIGNED BY SUPERPAVE, WEIGHTED AVERAGES & TOTALS         Absolute Mean-Target         1.20               \$1,37         \$1,87         \$1,20          \$1,33,460         SP           \$1,20           \$1,20          \$1,20          \$1,20          \$1,20          \$1,20          \$1,20          \$1,20          \$1,20	-		-												-		
COMPOSITE OF VD ACCPT DENSITY TESTS         \$32.23         \$4.0         171         0.87         94.0         -1.11         77.7         0.892         0.907         (\$103,348)         SP           DESIGNED BY SUPERPAVE, WEIGHTED AVERAGES & TOTALS         Absolute Mean-Target         1.20			-														
DESIGNED BY SUPERPAVE, WEIGHTED AVERAGES & TOTALS Absolute Mean-Target 1.20 COMPOSITE OF ALL VOID ACCEPTANCE \$28.07 394.3 786.0 0.97 94.00 -0.86 82.8 0.980 0.854 (\$11,951) FIELD DENSITY TESTS, WEIGHTED AVERAGES & TOTALS Absolute Mean-Target 0.89				5												A1	
COMPOSITE OF ALL VOID ACCEPTANCE         \$28.07         394.3         786.0         0.97         94.00         -0.86         82.8         0.960         0.954         (\$11,951)           FIELD DENSITY TESTS, WEIGHTED AVERAGES & TOTALS         Absolute Mean-Target         0.89         0.89         0.99         0.954         (\$11,951)         0.99 </td <td></td> <td></td> <td></td> <td>L</td> <td>· · -</td> <td>· · · · · · ·</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>(1.7</td> <td>u.892</td> <td>0.907</td> <td>(5103,348)</td> <td></td> <td>SP</td>				L	· · -	· · · · · · ·						(1.7	u.892	0.907	(5103,348)		SP
RELD DENSITY TESTS, WEIGHTED AVERAGES & TOTALS Absolute Mean-Tarbet 0.89		_		CAGES !				~~									
	F			L		28.07						82.8	0.960	0.954	(511,951)		
a the second second to a the second	HELD DENSITY TESTS, W	VEIGHT	D AVERAGE	S&TOT	ALS	and .		bsolute	Mean-T	anpet	0.89			~ ~ <del>~ 6 ~ ~ ~ ~</del>	Sector sector	w	
			. Enã ,	A A			×			<i>.</i>							

# Table 2HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY ELEMENT,PROJECT & MIX DESIGN FOR 1993 - 96 VOID ACCEPTANCE PROJECTS

	-	CT & M								-	1		<b>T</b>	1		
PROJECT	RG	YR COM,	PRC		BID \$/	TONS	TESI		CESS	MEAN		VA	QPM2	VA	CNT	AGG
LOCATION	#	SUBAC #	#	MENT	TON	1000	"n"	SD	TARG	- TAR	LEVL	PF	PF	I/D \$	CDE	GRA
Boundary with many more and		2	****										· · · · · · · · · · · · · · · · · · ·		1	
6th Ave, Wads-Fed	6	93,93092	•	Stab	\$29.25	21.1	24	3.60		3.20	81.8	0.996	0.965	(\$124)		С
Jct SH 165, N & S	2	94,92410	A	Stab	\$21.90	38.5	42	1.97		10.3	100.0	1.050	1.055	\$2,107	W2	C
Jct SH 165, N & S	2	94,92410	A1	Stab	\$21.90	1.5	NÅ	NA	NA	NA	NA	1.050	0.500	\$83	<b>W2</b>	С
Jct SH 165, N & S	2	94,92410	8	Stab	\$21.90	8.5	9	1.70		11.30	100.0	1.050	1.040	\$465	W2	С
Jct SH 165, N & S	2	94,92410	C	Stab	\$21,90	3,4	3	0.60		9.30	100.0	1.050	1. <b>025</b>	\$185	W2	С
Jct SH 165, N & S	2	94,92410	D	Stab	\$21.90	4.5	5	0.50	35.0	9.40	100.0	1.050	1.030	\$244	W2	c
Jct SH 165, N & S	2	94,92410	A	Stab	\$28.20	4.4	5	1.00	35.0	12.00	100.0	1.050	1.030	\$313	W2	CX
Jct SH 165, N & S	2	94,92410	в	Stab	\$28.20	10.0	10	2.30	35.0	12.60	100.0	1.050	1.040	\$704	W2	СХ
Jct SH 165, N & S	2	94,92410	С	Stab	\$28.20	4.4	4	2.20	35.0	9.80	100.0	1.050	1.030	\$308	W2	CX
Jot SH 165, N & S	2	94,92410	D	Stab	\$28.20	21.4	21	1.20	35.0	18.30	100.0	1.050	1.050	\$1,507	W2	СХ
Jct SH 165, N & S	2	94,92410	E	Stab	\$28.20	14.7	15	1.20	35.0	8.30	100.0	1.050	1.050	\$1,038	W2	CX
Pierce - Nunn	2	95,93262	A	Stab	\$25.00	22.4	23	1.28	40.0	8.00	100.0	1.048	1.050	\$1,343	K1	С
Pierce - Nunn	2	95,93262	в	Stab	\$33.00	12.8	13	3.67	40.0	16.00	100.0	1.039	1.045	\$825	<b>K</b> 1	С
JS 36, Sher - Wads	6	95,10678	A	Stab	\$23.40	29.1	29	1.70	40.0	7.10	100.0	1.050	1.050	\$1,701	<b>A1</b>	С
ict SH 50 - South	2	96,10791	A	Stab	\$26.00	72.3	73	2.04	37.0	4.08	97.9	1.035	1.059	\$3,305	K1	С
Ict SH 85 - North	2	96,10942	A	Stab	\$34.30	10.5	10	1.17	40.0	11.60	100.0	1.050	1.045	\$900	51	C
ct SH 85 - North	2	96,10942	B	Stab	\$34.30	30.8	30	2.76	40.0	10.60	100.0	1.050	1,055	\$2,641	S1	С
OMPOSITE OF ALL VO					\$28.94	310.3	316	2.01	37.2	8.76	98.3	1.042	1.043	\$17,547		
VEEM STABILITY TEST	TS, WEK	GHTED AVER	AGES &	TOTALS			Absolute	e Mean-	Target	8.76				- <u>-</u>		
70 Colfax - SH 26	8	96,11364	A	Stab		NA	NA	NA	NA	NA	NA	NA	NA	NA	A1	SP
70 Coltax - SH 26	8	96,11364	B	Stab		NA	NA	NA	NA	NA	NA	NA	NA	NA	A1	SP
70 Colfax - SH 26	6	96,11384	C	Stab		NA	NA	NA	NA	NA	NA	NA	NA	NA	A1	SP
orthgate - North	8	96,11373	A	Stab		NA	NA	NA	NA	NA	NA	NA	NA	NA	W2	SP
70, Colfax - Cir Cik	8	96,11512		Stab		NA	NA	NA	NA	NA	NA	NA	NA	NA	A1	SP
70, Colfax - Cir Crik	6	96,11512		Sab		NA	NA	NA	NA	NA	NA	NA	NA	NA	A1	SP
				-h	manatet. Y.		in mark?	A. 2."	Sunt :	vier in	· . · ·	.n.A.	1 M. C.		A.A	A
th Ave, Wads-Fed	6	93,93092	A	VMA	\$29.25	21.1	24	0.38	13.5	-0.63	93,9	1.038	1.041	\$4,696	W2	с
t SH 165, N & S	2	94,92410	Ā	VMA	\$21.90	38.5	42	0.25	13.0	0.26	100.0	1.045	1.055	\$11,400	W2	c
at SH 165, N& S	2	94,92410	A1	VMA	\$21.90	1.5	NA	NA	13.0	NA	NA	1.045	0.500	\$447	W2	c
zt SH 165, N & S	2	94,92410	В		\$21.90	8.5	9	0.22	13.0	0.21	100.0	1.050	1.040	\$2,793	W2	c
51 SH 165, N& S	2	94,92410	č		\$21.90	3.4	3	0,31	13.0	0.03	100.0	1.050	1.025	\$1,113	WZ	c
x SH 165, N & S	2	94,92410	D		\$21.90	4.5	5	0.38	13.0	0.14	100.0	1.050	1.030	\$1,462	W2	c
zt SH 165, N & S	2	84,92410	A		\$28.20	4.4	5	0.35	14.0	-0.96	88.1	1.031	1.030	\$1,402 \$1,174	W2	cx
rt SH 165, N & S	2	94,92410	В		\$28.20	10.0	10	0.21	14.0	-0.50	62.9	0.884	0.881	(\$9,831)	W2	CX
x SH 165, N & S	2	94,82410	c		\$28.20	4.4	4	0.35	13.0	0.97	71.4	0.985	0.985	• • •	₩2	CX
t SH 165, N & S	2	94,92410	D		\$28.20	21.4	21	0.35	14.0	-0.99	80.7	0.985	0.957	(\$573) (\$1,675)	₩2 ₩2	CX
t SH 165, N & S	2	•	_					0.24								
ierce - Nunn	2	94,92410 95,93262	E		\$28.20 \$25.00	14.7	15 29	0.25	14.0	-0.42	99.7 09.5	1.050	1.050	\$6,170	W2	CX
erce - Nunn	2	95,93262	A			22.4	23 49		13.0	0.58	98.5	1.045	1.050	\$5,018	K1	C
		•	B		\$33.00	12.8	13	0.46	13.0	0.62	90.2	1.015	1.026	\$1,287	K1	c
5 38, Sher - Wads	6	95,10878	A		523.40	29.1	29	0.37	13.6	0.69	91.9	1.032	1.029	\$4,354	A1	c
t SH 50 - South	2	96,10791	A		\$26.00	72.3	73	0.54	16.4	-0.42		1.002	1.013	\$587	K1 ~~	C
t SH 85 - North	2	96,10942	A		\$34.30	10.5	10	0.33	14.0	-0.57		1.047	1.045	\$3,400	S1	C
t SH 85 - North	2	96,10942			\$34.30	30.8	30	0.34	13.5		-	1.050	1.055	\$10,564	ទា	c
XMPOSITE OF VOID AC SIGNED BY TEXAS GY						310.3	316 Ubsolute	0.38	14.1	-0.10	93.4	1.023	1.022	\$42,366		
Colfax - SH 26		96,11364	A		29.15	1.2	2	NA	arger. 13.0	0.50	NA	1.000	1.000	\$0	<u>۸1</u>	SP
0 Colfax - SH 28																
0 Colfax - SH 26		96,11364 96,11364	B C		529.15 529.15	9.1 27.8	9 28	0.51 0.40	13.0 13.2			0.833	1.040 0.968	(\$8,895) \$2,237	A1 A1	SP SP
							20 21			-0.83		1.014		\$2,237 \$3,485		SP
ntingate - North		96,11373 98,11612			38.75	21.1		0.41	13.0			1.021	1.050	-	W2	
0, Colfax - Cir Crk		98,11512			531.40	3.5	4	0.47	14.0			1.049	1.030		A1	SP
0, Colfax - Cir Crk		96,11512	<u>B</u>		31.40	21.3	22	0.67	14.0			1.031	1.023		A1	SP
MPOSITE OF VOID AC					32.23	84.0	<b>86</b>	0.49 Mana Tr	13.4		91.2	1.002	1.013	\$2,009		SP
SIGNED BY SUPERPA			RAGES &				bsolute 1			0.54	<b>02 0</b>	048	1 000	/E44 DE41		
MPOSITE OF ALL VOID			Ĺ	1	28.07			0.39				1.018	1.020	(\$11,951)		
MA TESTS, WEIGHTED		Contraction of the second		· 8.			bsolute	Mean-Ta		0.51		din a		a sup a		•

Table 2
HOT BITUMINOUS PAVEMENT QC/QA DETAILS & SUMMARY BY ELEMENT,
PROJECT & MIX DESIGN FOR 1993 - 96 VOID ACCEPTANCE PROJECTS

PROJECT	RG	YR COM,	PRC	ELE-	BID \$/	TONS	TEST		CESS	MEAN			QPM2	VA	CNT	1
LOCATION	#	SUBAC #	#	MENT	TON	1000	"n"	SD	TARG	- TAR	LEVL	PF	PF	VD\$	CDE	GR/
in many should be	5. 						m.m.a.									
6th Ave, Wads-Fed	8	93,93092	A	Voida	\$29.75	21.1	24	0.40	3.3	-0.60	83.5	1.037	1.039	\$8,976	W2	С
Jet SH 165, N & S	2	94,92410	A	Voida	\$21.90	38.5	42	0.62	4.0	-0.14	<b>94.6</b>	1.034	1.037	\$11,467	W2	С
Jct SH 185, N & S	2	94,92410	<b>A1</b>	Voids	\$21.90	1.5	NA	NA	4.0	0.00	NA	1.034	0.500	\$450	W2	С
Jct SH 165, N & S	2	94,92410	8	Voids	\$21.90	8.5	9	0.24	4.0	-0.24	100.0	1.050	1.040	\$3,723	W2	С
Jct SH 165, N & S	2	94,92410	С	Voids	\$21.90	3.4	3	0.21	4.0	-0.83	100.0	1.050	1.025	\$1,484	W2	C
Jot SH 165, N & S	2	94,92410	D	Voids	\$21.90	4.5	5	0.52	4.0	-0.60	88.3	1.032	1.030	\$1,240	W2	С
Jct SH 165, N & S	2	94,92410	A	Voids	\$28.20	4.4	5	0.28	4.0	-1.12	60.2	0.903	0.902	(\$4,878)	W2	C
Jct SH 165, N & S	2	94,92410	Ð	Voids	\$28.20	10.0	10	0.38	4.0	-0.82	94.7	1.040	1.040	\$4,461	W2	C)
Jct SH 165, N & S	2	94,92410	С	Voids	\$28.20	4.4	4	0.37	3.0	0.85	81.6	1.022	1.025	\$1,087	W2	CX
Jet SH 165, N & S	2	94,92410	D	Voids	\$28.20	21.4	21	0.48	4.0	-0.52	95.1	1.041	1.048	\$9,768	W2	C
Jct SH 165, N & S	2	94,92410	E	Voids	\$28.20	14.7	15	0.28	3.0	0.19	100.0	1.050	1.050	\$8,301	W2	0
Pierce - Nunn	2	95,83262	A	Voida	\$25.00	22.4	23	0.52	4.0	-0.51	90,8	1.015	1.022	\$2,517	<b>K</b> 1	c
Pierce - Nunn	2	95,93262	B	Voids	\$33.00	12.8	13	0.51	4.2	-0.68	83.8	0.947	0.993	(\$6,666)	Kf	С
JS 36, Sher - Wads	8	95,10678	A	Voids	\$23.40	29.1	29	0.53	3.5	0.42	93.2	1.036	1.037	\$7,347	A1	С
Ict SH 50 - South	2	96,10791	A	Voida	\$26.00	72.3	73	0.5 <del>9</del>	4.0	-0.36	<b>91.9</b>	1.006	1.007	\$3,533	K1	С
Ict SH 85 - North	2	96,10942	A	Voids	\$34.30	10.5	10	0.37	4.0	-0.44	99.1	1.049	1.045	\$5,240	S1	С
ict SH 85 - North	2	96,10942	B	Voids	\$34.30	30.8	30	0.58	3.5	-0.30	93.9	1.038	1.038	\$11,917	51	С
COMPOSITE VD ACCE	PT AIR \	OIDS TESTS			\$26.98	310.3	316	0.51	3.8	-0.29	82.9	1.024	1.024	\$67,967		
SESIGNED BY TEXAS	GYRATC	RY, WTED A	VERAG	ES & TOT	ALS		Absolute	Mean-7	arget	0.41						
70 Colfax - SH 28	6	96,11364	A	Voids	<b>\$29</b> ,15	1.2	2	NA	4.0	-1,25	NA	0.778	0.889	(\$2,269)	A1	SP
70 Colfac - SH 25	8	96,11384	8	Voids	\$29.15	9,1	9	0.81	4.0	-1.55	29.2	0.833	0.581	(\$13,342)	A1	SP
70 Collax - SH 28	6	96,11364	С	Voide	\$29.15	27.8	28	0.43	4.1	-0.35	98,8	1.045	1.050	\$11,981	A1	SP
forthgate - North	6	96,11373	A	Voids	\$38.75	21.1	21	0.57	4.5	-1.44	<b>B1.0</b>	1.003	1.024	\$738	W2	SP
70, Colfax - Cir Crix	6	96,11512	в	Voids	\$31.40	21.3	22	0.76	3.8	-0.78	78.5	0.924	0.942	(\$15,332)	A1	SP
70, Colfax - Cir Crik	6	96,11512	A	Voids	\$31.40	3.5	4	0.79	3.8	-0.35	94,1	1.048	1.030	\$1,508	A1	SP
OMPOSITE VD ACCE	PT AIR V	OIDS TESTS			\$32.23	84.0	86	0.58	4.1	-0.88	82.6	0.978	0.960	(\$16,741)		SP
ESIGNED BY SUPERI	AVE, W	EIGHTED AV	RAGE	S& TOTAL	.s		Absolute	Mean-T	arget	0.68						
OMPOSITE OF ALL V	DD ACC	EPTANCE	•		\$28.10	394.3	402.0	0.52	3.67	-0.41	90.7	1.014	1,010	(\$11,951)		
R VOIDS TESTS, WE			TOTAL	S			Absolute	Mean-T	arget	0.51						
						E-Law -	a inginingi							- Annered		
TEM COMPOSITE OF	D ACCH	T PROJECTS			\$28.98	310.3	NA	NA	NA	NA	69.41	1.005	0.999	\$47,069	Rectification and	
ESIGNED BY TEXAS				S& TOTA												
EN COMPOSITE OF		· .	~~~		\$32.23	84.0	NA	NA	NA	NA	82.04	0.946	0.948	(\$129,486)		
ESIGNED BY SUPERA				A TOTAL	_									(+ ( (		
EM COMPOSITE OF		_			\$28,10	394.3	NA	NA	NA	NA	87.84	0.993	0.968	(\$82,419)		
LA COMPOSI E OF A	ALL VUL				#£9, IV	- <b></b>			1994	C1074	91.07	<b>U.230</b>	0.000	{@CLC, ~~ I 3}}		

TABLE 3 HBP EVALUATION SUMMARIZED BY YEAR, 1991 HISTORICAL & 1992 - 1996 QC/QA

HDF LV	ALUATION S	C BIRDAINS		EAR, 199		JACAL	& 1332 -	1330 20/	an
IDENTIFICATION		TONS	TESTS	STD	ME	AN -	QPM 2	QPM 1	QPM 2
YEAR	ELEMENT	1000s	ີກ"	DEV	TAR	GET	QUAL LEV	PAY FACT	PAY FACT
Composites are also	ent values weigh	ted by "W" fa	Zimmt dat	a are process	27422.5988	veighted	I tons. Grade	tion SD S Ma	en - Earget
1991	Asphalt %	2000	4027	0.18	0.07	Abs	87.0	1.005	1.000
Historical	Density %	900	1865	1.05	1.00	Aba	84.0	1.002	0.960
Elements	Gradation	2000	2317	2.59	1.82	Abs	85.7	1.005	0.989
Composite	Item	2000					85.2	1.004	0.978
1992	Asphalt %	282	214	0.14	0.06	Abs	96.3	1.039	1.042
QPM 1	Density %	282	570	1.00	0.71	Abs	88.9	1.018	0.990
Elements	Gradation	282	180	2.11	1.21	Abs	90.0	1.020	1.014
Composite	Item	282					91.3	1.025	1.010
1993	Asphait %	482	837	0.15	0.04	Abs	93.2	1.032	1.028
QPM1	Density %	482	969	0.96	0.48	Abs	92.4	1,028	1.018
Elements	Gradation	482	309	2.31	1.53	Abs	88.8	1.016	1.010
Composite	litern	482			ABS	ALGEB	91.9	1.027	1.019
1994	Asphait %	1496	1277	0.15	0.06	0.01	90.6	1.034	1.022
QPM1	Density %	1400	2812	` <b>0.96</b>	0.57	-0.47	90,3	1.023	1.007
Elements	Gradation	1496	1053	2.05	1.12	-0.93	88.3	1. <b>02</b> 1	1.014
Composite	ltem	1496					90.0	1.026	1.013
1995	Asphait %	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	ltem	776	···· —				84.2	1.008	0.976
1981 - 1995	Asphait %	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	<b>88</b> .7	1.019	1.014
SUMMARY QPM1	COMPOSITES	3036					88.9	1,021	1.004
1995	Asphait %	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	ltern	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	ltem 🛛	830					90.8	NA	1.012
1995 - 1996	Asphalt %	1158	1189	0.17	0.07	0.02	89.5	NA	1.006
Summary of	Density %	1144	2090	0.83	0.56	-0.51	91.9	NA	1.016
QPM 2 Elements	Gradation	1158	629	2.20	1.44	0.26	88.3	NA	1.006
SUMMARY OPM2 C	OMPOSITES	1158					90.4	NA	1.011
SUMMARY QC/QA	PROJECTS	4194					89.3	NA	1.006

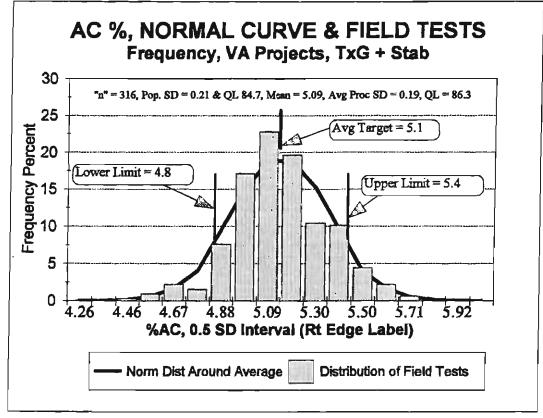
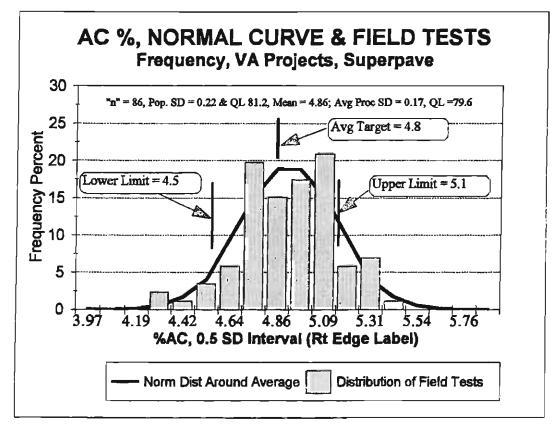


Figure 1





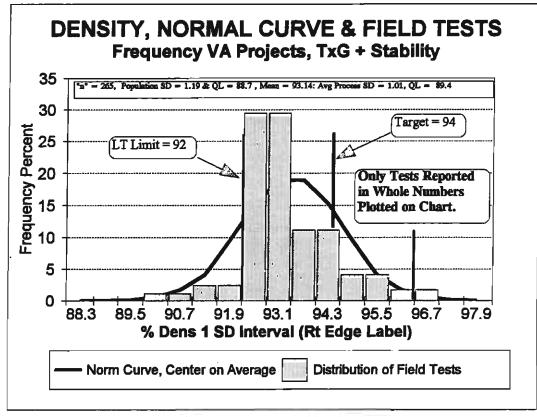
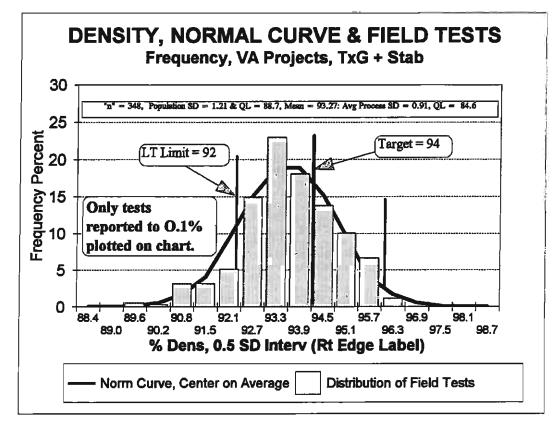


Figure 3



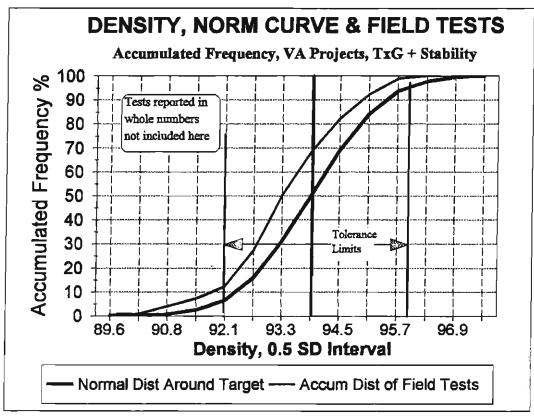
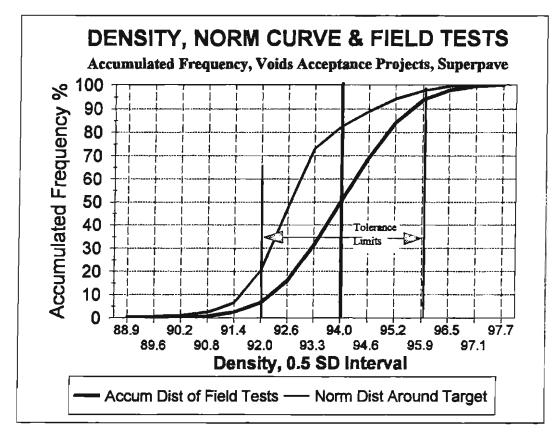


Figure 5



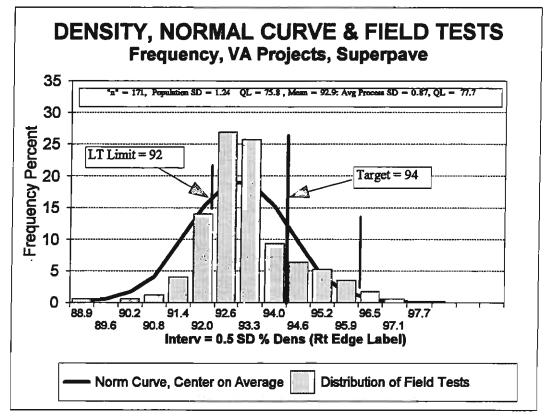
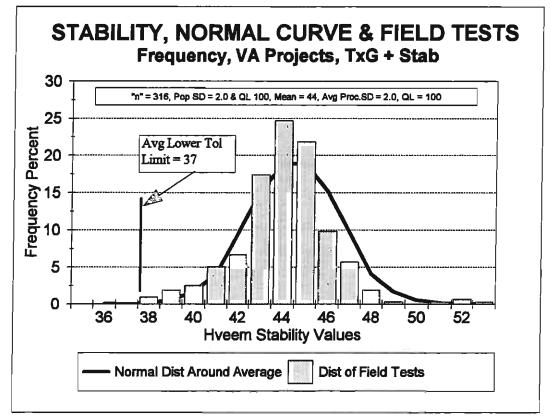


Figure 7



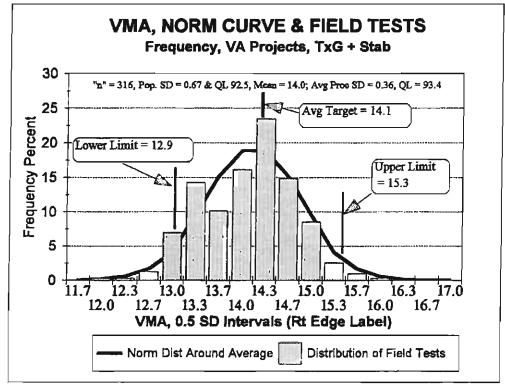


Figure 9

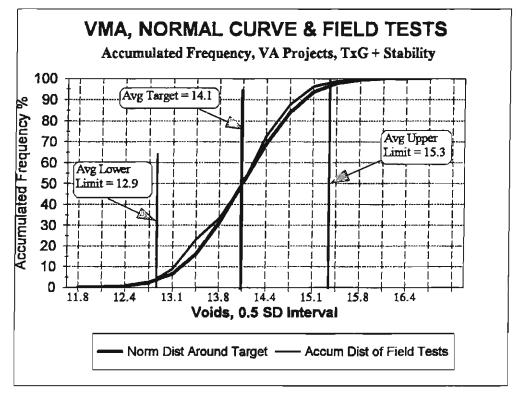


Figure 10

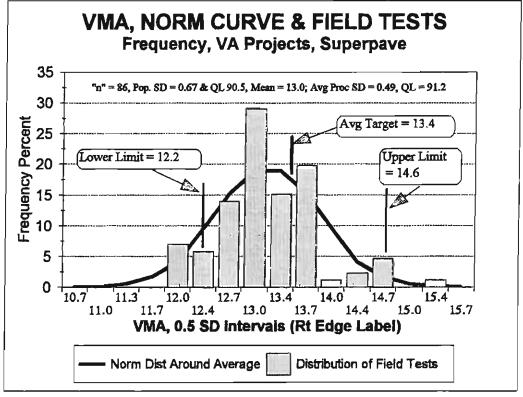
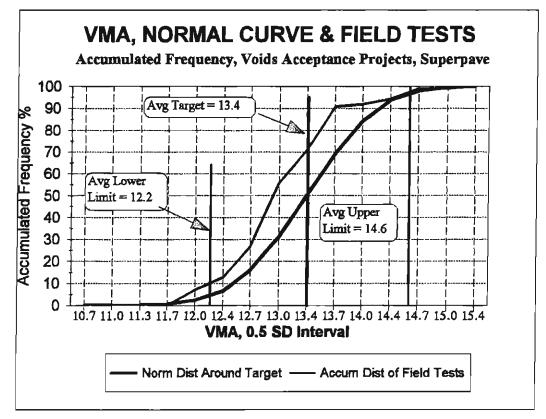


Figure 11



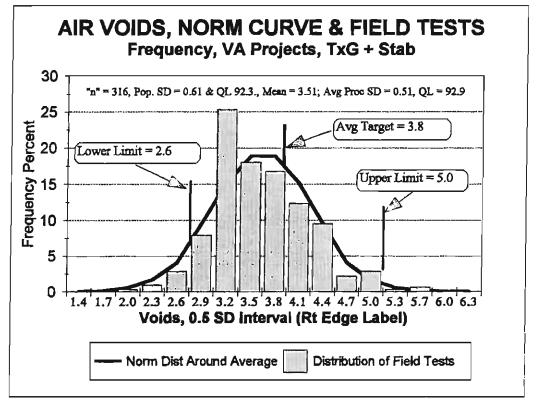
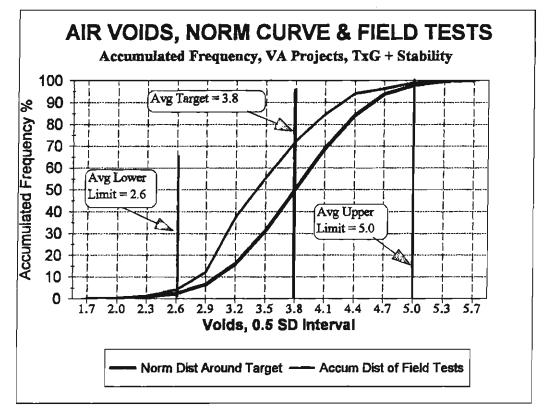


Figure 13



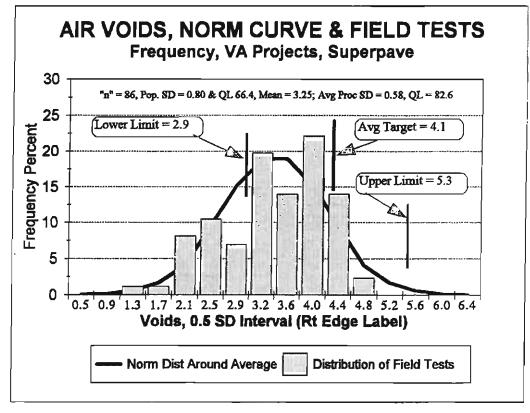
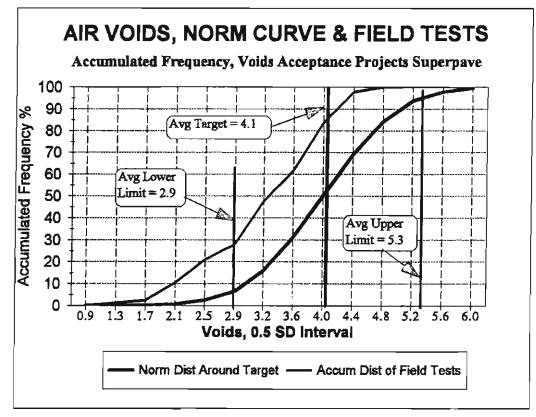


Figure 15



# Exhibit 1 Explanation of the CDOT Void Acceptance Pilot Program Tim Aschenbrener April 21, 1997

1) Modification of the 5-year plan. There have been modifications to the original 5-year plan. The original 5-year plan was developed based on a best guess of the time it would take to implement the program. The modifications to the plan have been essential to the proper implementation of the volumetric acceptance program. The purpose of this section is to document some of these reasons for the modifications.

After the first project in 1993, 3 different labs got 3 different answers. It was clear the implementation process would take longer. A brief summary follows documenting the increased time it took to ensure proper procedures were followed, operator training and checking was implemented, and equipment acquired.

# **Repeatable Tests.**

- 1994/1995 A great deal of study went into the procedures to make sure that tests were performed uniformly. This included round robin testing.
- 1996 The CP-Ls were re-written to take out ambiguities.

Spring 1996 CAPA certification became a requirement. This step was necessary to ensure all testers had experience and background to perform tests.

# Equipment Acquisition.

1001/1004	<b>T</b> • • • • • • • •	m , ,	• •
1991/1994	Equipment for the	Texas gyratory mixes	s were acquired.

- 1996/1997 Equipment for the Superpave mixes were acquired.
- Fall 1995 Trailers were made available to the Regions to demonstrate the volumetric acceptance program because projects were not always in the back yard of the Region lab. 1996 was really the first year all projects were field verified; however, this was a "shakedown" year.

# Specifications.

- 1993 The first volumetric acceptance specification (using test results for payment) was written and used.
- 1994/1997 Provisional volumetric specifications were used that did not apply pay factors for routine use in HBP projects. This was to help contractors learn about the process without being penalized. Additionally, the provisions encouraged adjustments to be made to the mixes.
- 1996 A check system is now in place for quality assurance of the volumetric test results. This uses 10K samples and the comparisons are done with each Region by the Central lab.
- 1996/1997 Superpave is a huge implementation effort. Superpave trial projects were built in 1996 and full implementation was available in 1997. This stalled the volumetric acceptance for 1 year. It would be too overwhelming to implement multiple specifications.
- 1997 With the arrival of the trailers and equipment, this is the first year that CDOT

	can really use the field verification of HBP effectively for all of the projects in
	each of the Regions.
1 <b>99</b> 7	A specification was written to allow contractors test results to be used for pay.
	Each Region was encouraged to use 2 projects. This specification was
	controversial and confusing so implementation was delayed by the Regions. It
	is estimated that it will be used on 2 pilot projects in Region 6.
Destants	

# Projects.

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1993	1 project: 6th Avenue.
1994	1 project: I-25 at Colorado City
1 <b>995</b>	2 projects: US-85 at Nunn, US-36 from Sheridan to Wadsworth,
1996	2 projects: I-25 at Fountain, SH-45 in Pueblo
1996	5 projects (Superpave): I-70 at Colfax, I-70 at Clear Creek, I-25 at AFA, I-25
	south of Pueblo, I-25 north of Trinidad

It is more important to implement the program correctly than to follow a preliminary schedule based on a best guess. Many obstacles have been overcome, and implementation is continuing.

2) Reason for Implementation of Voids Acceptance. There have been many studies showing that the volumetric properties of the HMA relate to performance. Although gradation acceptance is commonly used, it does not always relate to the long term performance of the pavement. These references can be found by myself on Colorado pavements, John D'Angelo in AAPT, and recommendations in Superpave. NCHRP 9-7 "Field Procedures and Equipment to Implement SHRP Asphalt Specifications" is also recommending using volumetrics for acceptance of HMA.

### EXHIBIT 2

### REVISION OF SECTION 105 CONTROL OF WORK

Section 105 of the Standard Specifications is hereby revised for this project as follows:

Subsection 105.03 shall include the following:

Conformity to the Contract of all Hot Bituminous Pavement, Item 403, will be determined in accordance with the following:

All work performed and all materials furnished shall conform to the lines, grades, cross sections, dimensions, and material requirements, including tolerances, shown in the Contract.

For those items of work where working tolerances are not specified, the Contractor shall perform the work in a manner consistent with reasonable and customary manufacturing and construction practices.

When the Engineer finds the materials or work furnished, work performed, or the finished product are not in conformity with the Contract and has resulted in an inferior or unsatisfactory product, the work or material shall be removed and replaced or otherwise corrected at the expense of the Contractor.

Materials will be sampled and tested by the Division in accordance with Section 106 and with the applicable procedures contained in the Division's Field Materials Manual. The approximate maximum quantity represented by each sample will be as set forth in Section 106, Table 106-1. Additional samples may be selected and tested at the Engineer's discretion.

Evaluation of materials for pay factors (PF) will be done on a lot basis. Lots will consist of a consecutive series of random samples, one from each sublot, for those items and elements listed in Section 106, Table 106-1. All materials produced will be assigned to a lot. Each lot will have a pay factor computed in accordance with the requirements of this Section. Test results determined to have sampling or testing errors will not be used:

Whenever two consecutive test results for an element are outside the tolerances, the Engineer shall create an experimental one-sample lot of each individual test. Each test shall be individually evaluated in accordance with the following:

- (1) A PF shall be computed for each test.
- (2) If the PF for the test is less than 0.75, the test shall constitute a lot and the material represented by the test shall be handled in accordance with subsection 105.03(e).
- (3) If the PF for the test is 0.75 or greater, the test shall not constitute a lot, and the test shall be placed in the appropriate lot.

# REVISION OF SECTION 105 CONTROL OF WORK

The Engineer shall establish a new lot when there are major changes in materials, a change in the job-mix formula, extended suspension of production or as otherwise deemed necessary. New lots may be established following the close of the pay estimate period.

Providing none of the above conditions exist, a lot may consist of any number of consecutive samples.

If there are less than three samples in a lot, the material will be evaluated as one-sample lots in accordance with the procedure below.

When it is necessary to represent a quantity by one or two tests, lots will be established represented by one test each, as determined by the Engineer. If the value of the test is within the specification limits, the lot will be assigned a pay factor (PF) of 1.00.

If the value of the test is above the maximum specified limit, then

 $PF = 1.00 - [(T_0 - T_u)/V]^2$ 

If the value of the test is below the minimum specified limit, then

 $PF = 1.00 - [(T_{T_1} - T_0)/V]^2$ 

Where: PF = pay factor V = V factor from table 105-1  $T_0$  = the individual test value  $T_L$ ,  $T_u$  = lower and upper specification limits, respectively

(a) Each lot of materials or work represented by three or more tests will be evaluated for Quality Level (QL) by CP 71.

Each lot of materials or work represented by three or more tests will be evaluated for Pay Factor (PF) by the following formulae:

- 1. When n = 3 and QL < 68, then  $PF = 0.410702 + 1.157738 (QL/100) \sim 0.423928 (QL/100)^2$
- 2. When n = 3 and  $QL \ge 68$ , then

 $PF = 0.572303 + 0.953058 (QL/100) - 0.475399 (QL/100)^2$ 

3. When n = 4, then PF = 0.264319 + 1.566711 (QL/100) - 0.781846 (QL/100)<sup>2</sup>

4. When n = 5, then  $PF = 0.232740 + 1.557903 (QL/100) - 0.739563 (QL/100)^2$ 

### -3-REVISION OF SECTION 105 CONTROL OF WORK

- 5. When n = 6, then  $PF = 0.161687 + 1.679072 (QL/100) - 0.790861 (QL/100)^2$
- 6. When n = 7, then

 $PF = 0.121571 + 1.727903 (QL/100) - 0.798947 (QL/100)^2$ 

7. When  $n \geq 8$ , then

 $PF = 0.103228 + 1.739576 (QL/100) - 0.792804 (QL/100)^2$ 

(b) A pay factor will be determined for each lot of material or work. For pay period estimates, or for any interim time period, each individual element will have the average pay factor  $(PF_A)$  for all the lots of the period, weighted by the quantities represented by each lot, computed as follows:

$$PF_{A} = [M_{1}(PF_{1}) + M_{2}(PF_{2}) + \dots + M_{j}(PF_{j})]$$

ΣΜ

Where:  $M_1 = Quantity$  of item represented by the lot.

 $PF_{i} = The lot pay factor.$ 

 $\Sigma M = Sum of Quantities, M_1 to M_j$  (the total quantity for the period).

(c) When there is more than one element for the item, determine the composite pay factor ( $PF_C$ ) for the time period as follows ( $\Sigma M$  used to compute each element  $PF_A$  must be numerically the same):

 $PF_{C} = [W_{1}(PF_{A1}) + W_{2}(PF_{A2}) + \dots + W_{j}(PF_{Aj})]$ 

ΣW

Where: W = element factor from Table 105-1.

PFAj = element average pay factor.

 $\Sigma W$  = sum of the element factors.

(d) Numbers in the above calculations will be carried to significant figures and rounded according to AASHTO Standard Recommended Practice R-11.

# REVISION OF SECTION 105 CONTROL OF WORK

(e) When PF for any element in a lot is between 0.75 and 1.05, the finished product will be accepted at the appropriate pay factor. If PF for any element in a lot is less than 0.75, the Contractor shall take corrective action before being permitted to continue production. If proper corrective measures can't be readily determined, the Engineer will suspend the use of such material until Laboratory tests indicate that the corrective measures taken by the Contractor will provide material that is in compliance. In addition, the Engineer may: (1) require complete removal and replacement with specification material at no additional cost to the Division; or (2) document the basis for acceptance by Contract Modification Order (CMO) and permit the Contractor to leave the material in place, if the finished product is found to be capable of performing the intended purpose and the value of the finished product is not affected. If the material remains in place, the CMO will make an appropriate price adjustment such that PF will not be greater than 0.75. The pay factor (PF) for the lot will be used in the applicable formulas when computing the average pay factor  $(PF_{A})$  and composite pay factor (PFc). 1. A. . .

The Contractor will not have the option of accepting a price reduction in lieu of producing specification material. Continued production of nonspecification material will not be permitted. All costs related to redesign of the asphalt mix and subsequent delays shall be borne by the Contractor. Material which is obviously defective may be isolated and rejected without regard to sampling sequence or location within a lot.

11

## **TABLE 105-1**

### Factors for Various Elements

Hot Bituminous Pavement								
Element	V factor	W factor						
Asphalt Content Voids in Mineral Aggregate (VMA) Air Voids (AV) In-Place Density	0.20 0.60 0.60 1.10	10 20 30 40						

# TABLE 105-1 (Where stability is included) "V' And "W" Factors for Various Elements

Hot Bituminous Pavement								
Element		V Factor	W Factor					
Asphalt Content		0.2	5					
Stability		3.0	5					
Voids in Mineral Aggregate (VMA)		0.6	20					
Air Voids (AV)		0.6	30					
Field Compaction		1.3	40					

#### -4-

# REVISION OF SECTION 105 CONTROL OF WORK

# TABLE 105-2Approximate Pay Factors

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			lity Le (n) and			
Pay Factor	n= 3	n= 4	n= 5	n= 6	n= 7	n = 8 TO n = X
1.05	100	100	100	100	100	100
1.04	90	91	92	93	93	93
1.03	80	85	87	88	89	90
1.02	75	80	83	85	86	87
1.01	71	77	80	82	84	85
1.00	68	74	78	80	81	82
0.99	66	72	75	77	79	80
0.98	64	70	73	75	77	78
0.97	62	68	71	74	75	77
0.96	60	66	69	72	73	75
0.95	59	64	68	70	72	73
0.94	57	63	66	68	70	72
0.93	56	61	65	67	69	70
0.92	55	60	63	65	67	69
0.91	53	58	62	64	66	67
0.90 0.89 0.88 0.87 0.87	52 51 50 48 47	57 55 54 53 51	60 59 57 56 55	63 61 58 57	64 63 62 60 59	66 64 63 62 60
0.85	46	50	53	56	58	59
0.84	45	49	52	55	56	58
0.83	44	48	51	53	55	57
0.82	42	46	50	52	54	55
0.81	41	45	48	51	53	54
0.80	40	44	47	50	52	53
0.79	38	43	46	48	50	52
0.78	37	41	45	47	49	51
0.77	36	40	43	46	48	50
0.76	34	39	42	45	47	48
0.75	33	38	41	44	46	47

### REVISION OF SECTION 106 CONTROL OF MATERIAL

Section 106 of the Standard Specifications is hereby revised for this project as follows:

Subsection 106.03 shall include the following:

All Hot Bituminous Pavement, Item 403, shall be tested in accordance with the following program of acceptance and assurance testing:

- (a) Acceptance Testing. The Colorado Department of Transportation (CDOT) shall be responsible for acceptance testing on all items in the Contract listed in Table 105-1.
  - 1. Frequency of Tests. Acceptance tests will be taken at the frequency specified in Table 106-1.
  - 2. Point of Sampling. The material for acceptance testing shall be sampled by the Contractor using approved procedures. The location where material samples will be taken shall be determined by the Engineer.
  - Calculations. Percent VMA in compacted paving mixtures and calculations of air voids in campacted mixtures will be calculated using methods described in the Asphalt Institute Handbook (MS-4) (1989) Section 4.2.
- (b) Assurance Testing. Except for asphalt content and in-place density, the CDOT Staff Materials Laboratory shall be responsible for assurance testing. Check tests for Stability, Voids in the Mineral Aggregate (VMA), and Air Voids (AV) shall become Independent Assurance Tests.

All materials being used are subject to inspection and testing at any time prior to, during, or after incorporation into the work. Assurance sampling and testing procedures will be in accordance with the Schedule for Minimum Materials Sampling, Testing and Inspection in the CDOT Field Materials Manual.

# REVISION OF SECTION 106 CONTROL OF MATERIAL

# TABLE 106-1 TESTING SCHEDULE FOR HOT BITUMINOUS PAVEMENT ACCEPTANCE TESTS

TEST	FREQUENCY
Determining Asphalt Cement Content of Hot Bituminous Pavements Determination of the Asphalt Binder Content of Bituminous Mixtures by the Ignition Method	1/1000 T minimum 1/Day
Determining Percent Relative Compaction of Bituminous Pavment	1/500 T
Maximum Specific Gravity of Bituminous Paving Mixtures	1/1000 T minimum 1/Day
Bulk Specific Gavity of Compacted Bituminous Mixtures	1/1000 T minimum 1/Day
Standard Method for Preparing and Deter- mining the Density of Hot Mix Asphalt Specimens by Means of the SHRP Gyratory Compactor	1/1000 T minimum 1/Day
	Determining Asphalt Cement Content of Hot Bituminous Pavements Determination of the Asphalt Binder Content of Bituminous Mixtures by the Ignition Method Determining Percent Relative Compaction of Bituminous Pavment Maximum Specific Gravity of Bituminous Paving Mixtures Bulk Specific Gavity of Compacted Bituminous Mixtures Standard Method for Preparing and Deter- mining the Density of Hot Mix Asphalt Specimens by Means of the SHRP Gyratory

CPL 5109	Resistence of Compacted Bituminous	1/work week
	Mixtures to Moisture Induced Damage	

Copies of CPL 5115 and CPL 5120 are available from the Region Materials Engineer.

### REVISION OF SECTIONS 401 COMPOSITION OF MIXTURES

Sections 401 of the Standard Specifications are hereby revised for this project as follows:

In subsection 401.02, Table 401-1, delete the tolerances for Hot Bituminous Pavement - Item 403 , and replace with the following:

#### Hot Bituminous Pavement - Item 403

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Voids in the Mineral Aggregate (VMA)±1.2%Air Voids±1.2%

In subsection 401.02 delete the tenth paragraph.