CHAPTER 12C

QUALITY PRICE ADJUSTMENTS

The Contractor must furnish Materials and perform the required Work in a manner that closely conforms to Contract requirements. As stated in Section 00150.25, if the Materials furnished or the Work performed are not in close conformance, the Resident Engineer (RE) may order the Materials or Work to be removed and replaced or may allow the Materials or Work to remain in place at a reduction in payment.

Some Contracts also allow the Contractor to receive a premium price adjustment (bonus) for Work or Materials that meet the requirements for such an adjustment.

To assess an adjustment and modify the Pay Item price, the RE will need to enter the amount of each adjustment in the 6000 series of the Contract Payment System (CPS), including a reference to the Pay Item. [Refer to Chapter 25 - Payments to Contractors/Retainage.]

Each lot must be entered as a separate adjustment, either positive or negative (as calculated by StatSpec per Section 12C-3). Enter the separate adjustments as 6026a, 6026b, etc.

The RE must also address the issue of quality of Materials and workmanship when completing the required Prime Contractor Performance Evaluation. [Refer to Chapter 34 - Contractor Performance Evaluation.]

Construction Materials and Work fall into one of the following categories:

1. When specified by the Contract, specified Materials and Work that are in close conformance with, or exceed the Contract requirements, will be paid at the full price plus a premium price adjustment (bonus).

2. Materials and Work that are in close conformance with the Contract requirements are paid at the full price.

3. Materials or Work that are not in close conformance with the requirements, but are considered suitable for the intended purpose, may be approved for use with an appropriate adjustment (reduction) in price. The RE must consult with the Professional of Record (POR) for the Work when determining whether the Material or Work is suitable for the intended purpose.

4. Materials or Work that are not in close conformance with the Contract requirements, and are not considered suitable for the intended purpose, shall be rejected and not incorporated into the finished Work unless the defects are corrected in a manner acceptable to the RE.

A Contract Change Order (CCO) is not required if one of the standard price adjustments listed in Section 12C-2 is used.

A CCO is required whenever a non-standard adjustment is made allowing no specification Material to remain in place.

Additionally, the RE must issue a CCO if any of the Contract Work is changed, including changes to any of the quality requirements included in the Contract.

If you have any questions regarding whether or not a CCO is required, contact the Region Assurance Specialist (RAS) or Contract Administration Unit (CAU) for guidance.

12C-1 Premium Price Adjustments (Bonus)

When specified by the Contract, the Agency will pay a bonus for Materials (normally Materials used in surfacings) or workmanship (including compaction of asphalt concrete or smoothness of pavement) that exceeds the specified Contract requirements.

Refer to the Specification for particular Materials to determine whether the Contractor may be eligible to receive a bonus payment.

The StatSpec program, discussed below, calculates a bonus or price adjustment for most surfacing Materials plus compaction of asphalt concrete.

Possible bonus payments for smoothness are addressed in Section 00745 for asphalt concrete and in Section 00755 for Portland Cement Concrete pavements.

All premium price adjustments must be listed on the Final Materials Certification (form 734-1979) when the final Project documentation is compiled for submittal at the completion of the Project. [Refer to Chapter 12B – Quality and Chapter 37 – Submittal of Final Project Documentation.]

12C-2 Price Adjustments

If the Contractor has supplied Materials that are not in close conformance with Contract requirements but are suitable for the intended purpose, the RE must assess a price adjustment if the Materials are to remain in place.

Obtain concurrence of the POR for the Work and assistance from the Region and others in determining if the Material or Work is suitable for the use intended.

Price adjustments must be assessed and administered in a uniform manner throughout the state. The following are standard price adjustment procedures to be used if Materials supplied to the Project are not in close conformance to Contract requirements:

A. Geotextile products – Contact the Geo-Environmental Section to determine if the product is suitable for use or should be rejected. If the Material test results show one or two failing property values, but the Material is still suitable for use, assess a 10% price reduction from the invoice price. If the Material test results show three or more failing property values, but is still suitable for use, assess a 25% price reduction from the invoice price.

B. Flexible Bituminous Adhesive – The Penetration @ 25°C can be no more than a 30 mm/10 maximum (per AASHTO T49) and the Elastic Recovery must be a minimum of 70% (per ODOT TM429). If either one of these tests fail, assess the price reduction as follows:

- For penetrations of 31-35mm/10 or an elastic recovery of 60-69%, assess a 10% price reduction.
- For penetrations of 36-45mm/10 or an elastic recovery of 40-59%, assess a 50% price reduction.
- For penetrations greater than 45mm/10 or an elastic recovery less than 39%, assess a 100% price reduction.

Calculate the adjustment based on the full price of the item, including the marker and recessing, if required, since, if the adhesive fails, the complete installation has failed.

C. Failing PG Asphalt Cement – The price adjustment for failing asphalt cement is calculated using the Summary of Failing Test Results for PG Asphalt Cements form 734-2283.

The Monthly Asphalt Cement Material Price (MACMP) for the Project will be used as the base price for applying the reduction in payment for asphalt cement Pay Items that do not have the "ER" designation for Elastic Recovery on polymer modified binders. For asphalt cement Pay Items with the "ER" designation, the MACMP for the Project will be increased by $100.00 prior to applying the reduction in payment for the "ER" asphalt Pay Item.

The RE will submit all Quality Control (QC) sublot samples of asphalt cement, sampled by the Contractor, to the ODOT Materials Laboratory. The Materials Laboratory will test the QC samples on a random basis. If any QC sample is determined to have deficient properties, the Materials Laboratory will test the sublot samples preceding and following the failing sample to determine the quantity of deficient asphalt. Testing of QC sublot samples will continue until samples are found to meet specified properties. The quantity of asphalt subject to a price adjustment is the quantity represented by the deficient sublot samples.

ODOT Quality Assurance will submit verification samples to the Materials Laboratory. The Materials Laboratory will test all verification samples. If any verification sample is determined to have deficient properties, the Materials Laboratory will identify and test the QC sublot samples closest to the time before and after the failing verification sample. Testing will continue until the Engineer is satisfied that all deficient sublots have been identified. The quantity of asphalt subject to a price adjustment is the quantity represented by the deficient sublot samples. If no QC sublot samples fail, the price adjustment will be made only for the quantity of asphalt determined by the Engineer to be represented by the failed verification test.

The asphalt cement price adjustment is based on the reduction factors from the "Failing Asphalt Cement Table" and procedures below. If an asphalt cement sample is deficient on more than one test property, the adjustment factor that applies is the larger of the factors identified for the failing test properties.

For Projects with multiple failing asphalt tests:

- If three or more consecutive sublot samples are found to have one or more failing test properties (excluding AASHTO T301), the reduction factor for all asphalt cement represented by the consecutive failing samples shall be 30% of the Monthly Asphalt Cement Material Price (MACMP).

- If five or more cumulative sublot samples are found to have one or more failing test properties (excluding AASHTO T301), the reduction factor for all asphalt cement represented by all failing samples shall be 30% of the MACMP.
- For "ER" designated binders only, if three or more consecutive, or five or more cumulative sublot samples are found to be deficient according to AASHTO T301, the reduction factor for all asphalt cement represented by the three or more consecutive, or five or more cumulative samples shall be 50% of the modified MACMP (MACMP + $100).

Failing Asphalt Cement Table

Test Property	Test Value	Percent of MACMPi (Reduction Factor)
Dynamic Shear of Original Binder: G*/Sinδ, kPa	0.95 - 0.99 0.90 - 0.94 0.70 - 0.89 Less than 0.70	5 15 25 Reject
Dynamic Shear of RTFO Binder: G*/Sinδ, kPa	2.10 - 2.19 2.00 – 2.09 1.60 - 1.99 Less than 1.60	5 15 25 Reject
Dynamic Shear of PAV Binder: (G*)Sinδ, kPa	5001 - 5500 5501 - 6500 5501 - 7000 7001 - 8000 More than 8000	5 15 25 30 Reject
Creep Stiffness of PAV Binder: S, Mpa	301 – 315 316 - 330 331 - 450 451 - 600 More than 600	5 15 25 30 Reject
m-value at 60 sec.	0.295 – 0.299 0.270 - 0.294 0.230 - 0.269 Less than 0.230	5 15 30 Reject
AASHTO T 301 For binders with "ER" designation	45 - 49 41 – 44 Equal to or less than 40	35 50 Reject

Reject Status: A Contract Change Order with a 50% price adjustment and the approval of the Technical Resource is required to allow material to remain in place that is in the Reject Status category.

Notes: Specified properties in AASHTO M320, table 1 for flash point, viscosity@135°C and mass loss are not considered performance related. Specification deficiencies for these properties shall be cause for a work stoppage until specification properties are met, but will not be cause for a pay adjustment.

Refer to paragraphs above table for directions when three or more consecutive, or five or more cumulative samples fail any of the listed test properties.

i Monthly Asphalt Cement Material Price

Price adjustments for failing asphalt cement supplied to the Agency will be based solely on the amount of virgin binder added to the asphalt concrete and should not penalize the Contractor for asphalt cement incorporated into the mix through the addition of recycled asphalt cement and mix moisture.

To properly calculate this amount, the following formula is used:

$$\textit{Virgin Asphalt Cement (tons)} = \left(\frac{LQ}{1+\left(\frac{MM\%}{100}\right)}\right) * \left(\frac{AC\%}{100}\right) * \left(1-\left(\frac{RAP\%}{100}\right)\right)$$

Where:

- LQ is the lot quantity in tons of ACP mixture in the sublot.
- MM% is the measured mix moisture from form 734-2277 for the sublot.
- AC% is the measured asphalt content from form 734-2277 for the sublot.
- RAP% is measured RAP% from form 734-2277 for the sublot.

This calculation is included on the Summary of Failing Test Results for PG Asphalt Cements form 734-2283.

D. Failing Emulsified Asphalt, Cold-In-Place Recycling Agents, Hot-Mix Recycling Agents and Pre-Coated Aggregate Asphalt Surface Treatment Binder – A price adjustment for the above asphalt Material is calculated using the Summary of Failing Test Results for Asphalt Cements, form 734-2283a.

Assess a price adjustment for the items listed in the subsection title if at least one of the following conditions are met:

- The total failing quantity is more than 10% percent of the total quantity incorporated into the project.
- There are two (2) or more consecutive failing samples from the same liquid asphalt source.

The MACMP for the Project will be used as the base price for applying the reduction in payment for asphalt Material Pay Items that do not have the "ER" designation. For asphalt Material Pay Items with the "ER" designation, the MACMP for the Project will be increased by $100.00 prior to applying the reduction in payment for the "ER" asphalt Pay Item.

- Assess a price adjustment equal to 25% of the MACMP for the quantity represented by each failing sample.

- Assess a price adjustment equal to 50% of the MACMP when any listed asphalt material has a TM 429 ER test result that is 5% or more below the specification limit.

Oregon Department of Transportation

SUMMARY OF FAILING TEST RESULTS FOR PG ASPHALT CEMENTS

PREPARED BY	DATE	REGION	REVIEW DATE	PROJECT NAME (SECTION)	CONTRACT NO.
Stuart Cobine		Robert Peters		US97: Willowdale - Madras	C15197
REVIEWED BY	**DATE**	**REVIEWED BY CONSTRUCTION**	**DATE**	**MATERIAL**	**BID ITEM NUMBER**
William Martin		Chris Duman	10/14/20	McCall PG 64-28	46 / 6042

DATE OF SAMPLE	SAMPLE NO. AND/OR SUBLOT NO.	LAB REPORT NO.	REDUCTION FACTOR (A)	MACMP for Project (B)	LOT QUANTITY (tons) (C)	MIX MOISTURE % (D)	AC % (E)	RAP CONTENT % (F)	VIRGIN AC QUANTITY (SEE NOTE #1 BELOW) (G)	PRICE ADJUSTMENT A*B*G	REMARKS
1-Sep-20	7-9	20-002352	0.30	$410.00	1000	0.19	5.38	28.10	38.61	$4,748.89	
1-Sep-20	7-10	20-002317	0.30	$410.00	1000	0.17	5.25	28.70	37.37	$4,596.38	
1-Sep-20	8-1	20-002318	0.30	$410.00	1000	0.15	5.31	28.10	38.12	$4,688.97	
2-Sep-20	8-2	20-002353	0.30	$410.00	1000	0.19	5.38	28.40	38.45	$4,729.07	
2-Sep-20	8-3	20-002354	0.30	$410.00	1000	0.12	5.31	28.10	38.13	$4,690.38	
2-Sep-20	8-4	20-002355	0.30	$410.00	1000	0.17	5.50	27.90	39.59	$4,869.29	
3-Sep-20	8-5	20-002319	0.30	$410.00	1000	0.11	5.37	28.30	38.46	$4,730.65	
3-Sep-20	8-6	20-002356	0.50	$410.00	1000	0.20	5.61	27.90	40.37	$8,275.31	This is under the reject category, See CCO
8-Sep-20	8-7	20-002357	0.30	$410.00	1000	0.17	5.47	28.20	39.21	$4,822.58	
9-Sep-20	8-8	20-002358	0.30	$410.00	1000	0.12	5.29	28.70	37.67	$4,633.72	
9-Sep-20	8-10	20-002320	0.30	$410.00	1000	0.16	5.44	28.90	38.62	$4,749.84	
10-Sep-20	9-1	20-002321	0.30	$410.00	1000	0.16	5.46	28.00	39.25	$4,827.65	
											Total = $60,362.73

SUBMIT WITH FINAL PROJECT DOCUMENTATION $60,362.73

NOTE #1 - Virgin Asphalt Cement Quanity Represented is calculated as follows:

$$\text{Virgin AC} = \left(\frac{C}{1+\left(\frac{D}{100}\right)}\right) * \left(\frac{E}{100}\right) * \left(1 - \left(\frac{F}{100}\right)\right)$$

734-2283 (5-2015)

DGoodell PI6046 $60,362.73 Est05 Note01

E. Failing Bituminous Mixtures – Price reductions for failing bituminous mixtures are calculated using the Summary of Failing Test Results for Bituminous Mixtures, form 734-3965. This form is only required when StatSpec is not used for the lot with failing Material to assess the adjustment.

Oregon Department of Transportation

SUMMARY OF FAILING TEST RESULTS FOR BITUMINOUS MIXTURES

PREPARED BY	DATE	REGION ASSURANCE SPECIALIST REVIEW	DATE	PROJECT NAME (SECTION)	CONTRACT NO.
Jason Plunkett	19-Oct			US395: Sidewalk Improvements (John Day) Project	15344
REVIEWED BY PROJECT MANAGER	**DATE**	**REVIEWED BY CONSTRUCTION**	**DATE**	**MATERIAL**	**BID ITEM NO.**
				Level 3, 1/2" ACP Mixture	520

DATE OF SAMPLE	TEST NO.	2 in. % OUT SPECS (A)	1-1/2 in. OR 25 % OUT SPECS (B)	3/4 in. OR 12.5 % OUT SPECS (C)	SUM OF (A) TO (C) % (1)	3/8 in. % OUT SPECS (D)	No. 4 % OUT SPECS (E)	No. 8 % OUT SPECS (F)	No. 30 % OUT SPECS (G)	2X SUM OF (D) TO (G) % (2)	No. 200 % OUT SPECS (H)	5 X (H) % (3)	MOIS-TURE % OUT SPECS (I)	5 X (I) % (4)	ASPHALT % OUT SPECS (J)	15 X (J) % (5)	QUANTITY REPRESENTED BY TEST (Ton) (6)	MIXTURE PRICE PER TON (7)	% TOTAL ADJUSTMENT SUM OF (1) TO (5) (8)	PRICE ADJUUSTMENT (6) X (7) X (8)
8/26/2022	1-1							9.00%		18.00%					0.38%	5.70%	62.74	$200.00	23.70%	$2,973.88
10/12/2022	1-2						6.00%			12.00%					0.14%	2.10%	75.99	$200.00	14.10%	$2,142.92

PRICE ADJUSTMENT DETERMINATION	WHEN (K) IS GREATER THAN (L) A PRICE ADJUSTMENT IS COMPUTED	JMF QUANTITY Mg	540.00	X 15 %	81.00	(L)	TOTAL FAILING MATERIAL	(K)	138.73	TOTAL ADJUSTMENT	($)	$5,116.79

MIXTURE PRICE DETERMINATION	MIX FORMULA CEMENT %	X	ASPHALT CEMENT BID PRICE PER TON	=	CEMENT PRICE PER TON OF MIXTURE (M)	AC MIXTURE BID PRICE PER TON (N)	MIXTURE (M) + (N) = PRICE PER TON (7)
		X	$ -	=			
		X	$ -	=			

734-3965 (11-15-2020) SUBMIT WITH FINAL PROJECT DOCUMENTATION

F. F**ailing Density Tests for Bituminous Mixtures** – Price reductions for failing density tests for bituminous mixtures are calculated using the Summary of Failing Density Tests for Bituminous Mixtures, form 734-3946. This form is only required when StatSpec is not used for the lot with failing Material to assess the adjustment.

G. Failing Aggregate Tests – Price reductions for failing tests for aggregates are calculated using the Summary of Failing Test Results for Aggregate, form 734-3966. This form is only required when StatSpec is not used for the lot with failing Material to assess the adjustment.

H. Failing Concrete – Price reductions for failing PCC (Concrete) strength are calculated using the Price Reduction Computations for Low-Strength Non-Statistical Concrete ("CONCAL" Program). This program will calculate either a price reduction, or rejection of the concrete represented by the test:

Oregon Department of Transportation
PRICE REDUCTION COMPUTATIONS
FOR LOW STRENGTH NON-STATISTICAL CONCRETE
Concal Version 4.0, Use for concrete placement after 1997

Section Name:	US101: Farmer Creek Bridge	Mix Design No.	20-CMD501
Prime Contractor	Bent, LLC	County	Tillamook
Project Manager	Jayson Buchholz	Contract No.	C15152
Data Sheet No.	F41260-174	Lab Number	20-001909
Concrete used for	Bridge Deck		

SPECIFIED CLASS OF CONCRETE (f'c).....	4500	psi
ACTUAL 28 DAY CONCRETE STRENGTH (fcc).....	3890	psi
PERCENT ACTUAL VS SPECIFIED STRENGTH.....	86.44	%
PRICE REDUCTION FACTOR (PRF) = (((f'c - fcc) / (0.15 f'c)) ^2) [report as percent].....	81.67	%
TYPE OF UNIT (cubic meter, square meter, cubic yard, square yard, each, etc.).....	cubic yards	
QUANTITY REPRESENTED (QR) (cubic meter, sq meter, cubic yard, sq yard, each, etc.)..	24	
INVOICE PRICE PER UNIT (PPU)..... (If contractor and supplier refuse invoice request, use 0 and theoretical unit price computation below.)	$240.00	

This box only applies if the Contractor and Supplier refuse to provide an invoice price, document attempts

THEORETICAL UNIT PRICE(TUP)(bid amount / special provision quantity)	$0.00
COST REDUCTION FACTOR (CRF) (85% When reinforcement is not paid separately, 100% when reinforcement is a separate pay item).....	85.00%
COMPUTED THEORETICAL UNIT PRICE(PPU).(TUP)*(CRF)*30% ..... (assumes concrete value is 30%)	$0.00
MINIMUM ALLOWED THEORETICAL UNIT PRICE(PPU).{$100 Minimum}.....	$100.00

PRICE REDUCTION = (PRF/100) * QR * PPU..... $4,704.08

**CALL ENGINEER OF RECORD TO DETERMINE ACCEPTABILITY OF MATERIALS PER SECTION 00150.25.
CALL RAS REGARDING PRICE ADJUSTMENT

PREPARED BY: Adam L Rose September 14, 2020

REGION REVIEWER: _____

ENTER THIS CONCAL PRICE ADJUSTMENT ON THE FINAL MATERIALS CERTIFICATION FORM 734-1979

If the CONCAL calculation shows the concrete Materials to be 85% or less of the required strength, it will calculate as "REJECTED". The POR must be contacted to determine the acceptability of the Materials per 00150.25.

Oregon Department of Transportation
PRICE REDUCTION COMPUTATIONS
FOR LOW STRENGTH NON-STATISTICAL CONCRETE
Concal Version 4.0, Use for concrete placement after 1997

Section Name:	Umatilla 6th street Yerxa to Bridge	Mix Design No.	ODOT 5 sack 3000psi
Prime Contractor	Wildish	County	Umatilla
Project Manager	Brian Strasser	Contract No.	C15154
Data Sheet No.	04076	Lab Number	20-01317
Concrete used for	Patterned Surfacing		

SPECIFIED CLASS OF CONCRETE (f'c).....	3000	psi
ACTUAL 28 DAY CONCRETE STRENGTH (fcc).....	2280	psi
PERCENT ACTUAL VS SPECIFIED STRENGTH.....	76.00	%
PRICE REDUCTION FACTOR (PRF) = (((f'c - fcc) / (0.15 f'c)) ^2) [report as percen	100.00	%
TYPE OF UNIT (cubic meter, square meter, cubic yard, square yard, each, etc.).....	cubic yards	
QUANTITY REPRESENTED (QR) (cubic meter, sq meter, cubic yard, sq yard, eacl	6	
INVOICE PRICE PER UNIT (PPU).....	$186.50	

(If contractor and supplier refuse invoice request, use 0 and theoretical unit price computation below.)

This box only applies if the Contractor and Supplier refuse to provide an invoice price, document attempts

THEORETICAL UNIT PRICE(TUP)(bid amount / special provision quantity)	$0.00
COST REDUCTION FACTOR (CRF) (85% When reinforcement is not paid separately, 100% when reinforcement is a separate pay item).....	85.00%
COMPUTED THEORETICAL UNIT PRICE(PPU).(TUP)*(CRF (assumes concrete value is 30%)	$0.00
MINIMUM ALLOWED THEORETICAL UNIT PRICE(PPU).{$100 Minimum}.....	$100.00

PRICE REDUCTION = (PRF/100) * QR * PPU..... **REJECTED

**CALL ENGINEER OF RECORD TO DETERMINE ACCEPTABILITY OF MATERIALS PER SECTION 00150.25.
CALL RAS REGARDING PRICE ADJUSTMENT

PREPARED BY:_____ April 15, 2021

REGION REVIEWER:_____ _____

ENTER THIS CONCAL PRICE ADJUSTMENT ON THE FINAL MATERIALS CERTIFICATION FORM 734-1979

I. **Statistical Analysis** – Price reductions and bonus payments for statistically analyzed materials (ACP and PCC) are calculated using the ODOT StatSpec Price Adjustment Program for AC Mixtures. (Refer to Section 00165.40 - Statistical Analysis.) Also, see the StatSpec Preparation Guide in Section 12C-3 of this chapter.

J. **Smoothness Bonus** – Price adjustments (positive or negative) for smoothness of either ACP or PCC, are calculated using the Smoothness Pay Adjustment Spreadsheets. Instructions for price adjustment calculations for ACP smoothness specification are defined in Section 00745.70 and for PCC paving located in Section 00755.55 as well as Section 12C-4 of this chapter.

K. **Missing Process Control Tests and Missing Reports** – Missing process control testing required to be performed by the Contractor is assessed by using the ODOT Construction Material Services test cost price list. If a test performed by the Contractor is not included on the list, the hourly technician rate should be used, times the length of time it takes to perform the test and issue the report. Mileage for sampling and testing also needs to be added on to the adjustment. Missing reports also need to be assessed at the hourly technician rate for each report not submitted.

Many other Materials do not have a standard price adjustment procedure for Materials that are not in close conformance. In those situations, the RE must develop a cost that would be incurred by the Agency or other owner, due to the shorter expected useful life of the product.

In developing such a cost of shorter expected useful life, consider one or more of the following:

- Based on the expected life of the specified Material, how much value is being lost because of the shorter expected useful life of the supplied Material?
- How much additional maintenance will be needed for repairs due to the lesser quality of the supplied Material?
- Any other impacts that may occur due to the lesser quality of the supplied Material.

Obtain assistance from the Region, District Manager, Region Assurance Specialist (RAS), or Contract Administration Unit (CAU).

The CAU approves all price adjustments that have been prepared by the RE and reviewed by the RAS for Materials or Work that do not have predetermined price adjustment procedures. Contact the RAS and the CAU for advice and assistance.

Give the Contractor written notice of the adjustment after receiving the concurrence of the CAU. At the completion of the Project, all quality price adjustments must be listed on the Final Materials Certification, form 734-1979. [Refer to Chapter 12B – Quality and Chapter 37 – Submittal of Final Project Documentation.]

12C-3 StatSpec Preparation Guide for 00745 ACP Statistical Analysis

In order to simplify the statistical analysis of Materials defined in Section 00165.30, ODOT has developed an Excel spreadsheet called StatSpec. StatSpec is used to calculate pay factors (PF) and composite pay factors (CPF) used in determining asphalt bonuses for superior quality Materials and price adjustments (reductions) for non-specification Materials. StatSpec is also used to calculate the quality levels of test results from the Contractor's process control.

This guide has been written for people who have a basic understanding of the testing procedures and requirements of Section 00745 - Asphalt Concrete Pavement (ACP). For answers to specific questions regarding StatSpec, contact the RAS or the Sr. Quality Assurance Coordinator (Sr. QAC) for your Region. You may also contact the CAU.

A. Starting a New File

Open the StatSpec program. Go to the File option on the top tool bar and choose the "New Project" option. This will allow you to input data in the Statistical Testing Input Data worksheet.

B. Statistical Testing Input Data

Prepare one StatSpec file for each lot of Material to be analyzed. Each lot must contain at least three sublots in order for it to be statistically analyzed. A standard deviation cannot be computed with less than three numbers.

1. In the heading, enter all Project and Material information for the lot of Material that is to be analyzed. This information can be found in the Special Provisions and on the Job Mix Formula (JMF). It is important to input all requested Project information because CAU is maintaining a database for all ACP price adjustments, and this information is used to populate the database.

   If the "Level" cell on the statistical testing input data sheet is blank, you will be prompted to "Select Mix Level" when calculating the ACP Price Adjustment. This information is shown on the approved JMF.

- Level 1 – Low Traffic; Limited Trucks
- Level 2 – Low Traffic; Low Trucks
- Level 3 – Moderate Trucks
- Level 4 – Very Heavy Traffic

If the "Lift" cell on the statistical testing input data sheet is blank, you will be prompted to "Select Lift" when calculating the ACP price adjustment.

- Base
- Wearing
- Leveling – when the CPF is greater than 1.0000 it will be reduced as follows; Reduction in CPF = (CPF-1) x 0.5 (per section 00745.95)
- Temporary – when the CPF is greater than 1.0000 it will be reduced as follows; Reduction in CPF = (CPF-1) x 0.5 (per section 00745.95)

2. Enter each of the constituents that are to be evaluated. This information is shown on the approved JMF.

   The mix type determines the screen sizes that are to be evaluated. Asphalt, moisture, and compaction are also analyzed. Asphalt and moisture content must be entered as Asph and Moist. The program looks for the constituents labeled Asph and Moist so that it can use the analyzed data to perform additional calculation. If the asphalt cement is to be paid by statistical analysis, asphalt and moisture content test averages will be used to automatically calculate the asphalt cement pay quantity.

3. Enter the weighting factor for each constituent. This information is shown in the table in Section 00745.95. Be sure to check the Project Special Provisions for any changes to the Standard Specifications.

4. Enter the upper specification limit and the lower specification limits (USL & LSL) for each constituent. This information is located in Section 00745.14 - Tolerances and Limits. Be sure to check the Project Special Provisions for any changes to the Standard Specifications.

   For ACP price adjustments, the USL and LSL are based on the JMF target values for each constituent. The JMF target values are identified on the approved JMF. From Section 00745.14, determine the USL and LSL based on the tolerance for that constituent.

For the larger screen sizes (1½", 1", 3/4", 1/2" and 3/8"), you will be directed to go to the broadband limits tables under Section 00745.12. If there is both a minimum and a maximum control point value for the larger screens, the maximum value for the constituent will be the USL and the minimum value will be the LSL. If there is not both a maximum and minimum value, add 5 % to the JMF target value for the USL and subtract 5% from the JMF target value for the LSL.

For all of the other constituents, add the corresponding value in Section 00745.14 to the JMF target value for the USL and subtract the corresponding value from the JMF target value for the LSL.

For USL of 100, enter 100, except, in the case of Control Strip Compaction, enter 100cs. For LSL of 0, enter 0. The worksheet internally uses the following conversions to ensure that the correct answer is calculated:

0 = -1E+09 100 = 1E+09 100cs = 9E+09

When performing Mix Design Verification (MDV), adjustments are sometimes made to the JMF target values without changing lots. (See Section 00745.16(4)(a).) In these situations, the target value may be considered to be 0 and the USL & LSL are entered as a ± the tolerance. The test results must then also be entered as a +/-± change from the target value.

Example:

A 5.50% asphalt target value is specified in the JMF for a 3/4" Dense Graded ACP Mixture. The tolerance, based on asphalt content determination using the incinerator method of extraction, is ±0.50% (per Section 00745.14). The USL would then be 0.50 and the LSL is –0.50. Test results calculated an asphalt content of 5.63% for sublot 1. The target value was then increased to 5.60% asphalt. The test result for sublot 2 determined the asphalt content to be 5.58%. The value entered for asphalt under sublot 1 would be the test result minus the original target value. The value entered for asphalt under sublot 2 would be the test result minus the new target value.

Value for Sublot 1 5.63 - 5.50 = 0.13

Value for Sublot 2 5.58 - 5.60 = -0.02

5. Any time that the JMF is adjusted and the target values change, the changes must be clearly documented so that the data in StatSpec may be properly verified. The following columns have been provided on the statistical data sheet to record additional pertinent project information:

    - Target Value % Asphalt – when an adjustment to the liquid asphalt target value is made, enter the new target value in this column. The weighted average of the target values for the asphalt will automatically be calculated and used to determine the ACP price per Ton on the Price Adjustment Computation sheet.
    - Ton – by entering the number of Tons of ACP that each test represents, the total Tons of ACP will automatically be calculated and used in determining the ACP adjustment.
    - Test# – Used to track Lot# - Sublot# tests.
    - Date – Used to track the paving/testing dates.

6. Enter the Contractor's test results for each constituent that is to be analyzed. Each test represents a sublot. Each sublot will represent up to 1000 Ton of material.

C. Quality Level Analysis and Computing Pay Factors (PF) and the Composite Pay Factors (CPF)

StatSpec will automatically perform the Statistical Analysis that is defined in Section 00165.30 and compute the CPF for the subject lot of Material. A CPF greater than 1.0000 will be considered of superior quality and eligible for a bonus. The maximum CPF is 1.0500, unless it is limited by the Contract. Material with a CPF of less than a 1.0000 will be subject to a price reduction. Any Material with a CPF of 0.7500 or less may be subject to removal as predefined in Section 00165.40(c) and 00150.25.

1. Click on "Calculate" option on the upper tool bar, highlight the "Composite Pay Factor" on the drop down menu, and click. StatSpec will automatically calculate the CPF on the statistical computation worksheet.

2. To return to the statistical data input sheet, click on the "View" option, then "Project Data" on the upper tool bar and highlight one of the three (3) options.

    - View – return to the statistical data input sheet.
    - Non-Spec Highlight – highlight all non-specification test results on the statistical data input sheet.
    - No Highlighting – removes non-specification highlighting on the statistical data input sheet.

D. Calculating the Price Adjustment

Click on the Calculate option on the upper tool bar. Click on Price Adjustment on the drop down menu.

1. If the "Level" and "Lift" cells on the input data sheet are not filled in, you will be prompted to choose information from a pop-up menu. (See page 1.)

2. You will be asked, "Is there a separate BI for the liquid asphalt?" If Yes – go to prompt:

   - "All paid by test results"– The liquid asphalt pay quantity will be calculated and appear on the price adjustment computation sheet.
   - "Part paid by test results" – You will be prompted to enter the beginning and ending sublots that liquid asphalt should be paid by test results. Only the liquid asphalt pay quantity for the sublots input will be calculated and appear on the price adjustment computation.
   - "All paid by tank stickings" – No calculation will be made and it will be noted on the price adjustment computation sheet that tank stickings were used to pay the liquid asphalt.

   If No – You will be prompted to enter the ACP bid price per Ton and you will not be asked to enter a price for liquid asphalt under step 3. Only the ACP bid price will be used on the price adjustment computation sheet.

3. You will be asked to enter the liquid asphalt bid price per Ton. This information is used to calculate the actual price per Ton of ACP.

4. You will be asked to enter the ACP bid price per Ton. This information is used to calculate the actual price per Ton of ACP.

5. You will be asked to enter the total Ton of ACP represented by this lot. If the Ton column on the input data sheet was used, the total Ton entered in that column will automatically appear in the box. If the column has not been used, the program will automatically multiply the number of sublots by 1000 Ton and that number will appear in the box. Verify the number shown or enter the total Ton quantity that the lot represents.

E. Saving the File

Go to the File option on the top tool bar and choose the "Save Project" option. Name your file. StatSpec assigns an .ss extension to the file name.

StatSpec data files that are saved in version 3.70 are not compatible with previous versions. StatSpec 3.70 will read data files saved with previous versions, but additional data will need to be added to the header information.

12C-4 ACP Smoothness Specification (Special Provision Section 00745.70)

A. Instructions for Calculating Price Adjustments

If the Contract includes Section 00745.70, calculate a price adjustment, as follows, for smoothness for the wearing surface course of paving only.

Use the appropriate electronic spreadsheet form to calculate the price adjustment specific for the maximum bonus specified in the Contract and for the proper type of mixture. Parts of the calculation processes are different between open graded and dense mixtures.

This document provides instructions for entries in the spreadsheet.

B. Open Graded Mixture

Refer to the spreadsheet for open graded mixture using the correct specified maximum bonus. The shaded cells require entry. The non-shaded cells contain formulas and are protected. Enter the following information:

Heading: Enter Project information in the heading area.

Cost per Foot: Use this portion of the spreadsheet to calculate the unit cost of the ACP mixture per foot of the width paved with or for the travel lane. Complete a separate spreadsheet for each width paved.

Paving Width (ft): The Contract specifies that ACP mixture placed in the travel lane, plus any additional width in the same "pull" (i.e., placed with the same paving machine at the same time the travel lane is paved), is eligible for smoothness price adjustment. A shoulder paved with a second paver as a "hot lap" is not considered to be in the travel lane "pull" since the shoulder was paved with a different machine.

When the paving width varies, calculate a weighted average paving width based on the typical sections and lengths shown in the Plans. Disregard guardrail flares or driveway approaches in the weighted average calculation as they are too small to affect the final average width. Split the length of taper sections so that half the section has the smaller width and half the larger. For example:

Station 33+50 to 35+50 = 15′ wide

Station 35+65 to 37+65 = 200′ length taper section,
15′ wide to 18′ wide

Station 37+65 to 40+65 = 18′ wide

Weighted Average Width = $\frac{[(200 \times 15) + (300 \times 18)]}{600}$ = 14′

Include all calculations of weighted average paving widths with the price adjustment.

Lift Thickness (in): Enter the thickness of the wearing course in inches.

JMF No.: Enter the Job Mix Formula (JMF) number.

Maximum Specific Gravity (Ton/yd^3): Enter the maximum specific gravity, shown in the JMF, for the target asphalt content. If the asphalt content is adjusted from that on the original JMF during production, interpolate a new maximum specific gravity for the adjusted asphalt content from the information in the JMF, as shown in the following example:

Example: 5 Sublots at 2.452 12 Sublots at 2.460

Weighted Average Gravity = $\frac{[5 \times (2.452) + 12 \times (2.460)]}{17}$ = 2.458

Include this calculation with the price adjustment.

Total Air Voids (%): Enter the total air voids, shown in the JMF, for the target asphalt content. If the asphalt content is adjusted from that on the original JMF during mixture production, interpolate a new total air voids for the adjusted asphalt content from the information in the JMF, similar to the above example for weighted average Maximum Specific Gravity.

Include this calculation with the price adjustment.

Mixture Bid Price per Ton: Enter the bid price for the open graded mixture.

Asphalt Bid Price per Ton: Enter the bid price for the asphalt cement used for the open graded mixture.

Percent Asphalt: Enter the asphalt content from the cell in the StatSpec adjustment worksheet labeled “ACP Mix Formula Cement %”.

The spreadsheet will automatically enter the volume per foot of paving width, tons per foot of paving width, and the mixture cost per ton appropriate cells below.

Price Adjustment Calculation: Use this portion of the spreadsheet to enter the smoothness test data, measured and supplied by the Contractor, and to calculate the price adjustment for each segment. Each segment is normally 0.1 mile long. Partial segments less than 0.5 mile in length are combined with the immediately preceding full segment. Partial segments 0.5 mile in length or greater shall be analyzed separately. Segment lengths are addressed in Section 00745.73(d-2).

Dir/Lane: Enter the direction of travel (EB, WB, NB, SB, etc.) and lane (left, right, center, pass, etc.) applicable to the price adjustment calculation.

Begin: Enter the beginning station of each segment.

End: Enter the ending station of each segment. Also, enter each stationing equation that occurs in a segment. The spreadsheet will automatically calculate the segment length, with adjustment for any equation.

Count (in): Enter the count in inches for each segment. This is noted on most profilometers or profilograph printouts as "count" or "inches". This number is used to calculate the Profile Index.

Profile Index (in/mile): The spreadsheet will automatically calculate the Profile Index. Since most profilometer or profilograph printouts will also show the Profile Index, this is a good cross-check.

Cost (per foot of pull): The spreadsheet automatically enters this cost, based on the data entered above.

Corrective Action (Y/N): In addition to the Profile Index calculation for bonus/penalty, Section 00745.70 also requires evaluation of individual bumps, as defined in Section 00745.75(c). Ultimately, the RE must decide which individual bumps must be corrected. A segment is not eligible for bonus payment for smoothness if the Contractor performed corrective work (bump grinding) in that segment.

Enter "Y" if corrective work must be or is performed in a segment, and the program will automatically eliminate any bonus for that segment per Section 00745.96(b). If no corrective work is required or performed in a segment, leave the space blank and the program assumes an "N".

Include a document listing all individual deviations exceeding 0.36 inches, showing whether each deviation was corrected or not.

Contract Unit Price Adjustment: The program will calculate the price adjustment percentage based on the price adjustment table included in the Contract and in this spreadsheet.

Adjustment: This is the dollar value of the ACP Smoothness price adjustment (positive or negative) for each segment.

Date: Enter the date the testing was completed for that segment.

Enter the Sheet Total (either positive or negative) on the progress estimate to assess the ACP Smoothness price adjustment

C. Dense Graded or SMA Mixture

Refer to the spreadsheet for dense graded or SMA mixture using the correct specified maximum bonus. The shaded cells require manual entry. The non-shaded cells contain formulas and are protected.

Entries for this spreadsheet are identical to those for the spreadsheet for open graded mixture except for the following cells:

Last MAMD for Project (lb/ft^3): This replaces the "Maximum Specific Gravity" field in the open graded spreadsheet. Enter the last MAMD for the dense graded mix on the Project.

Average Compaction for Project (%): This replaces the "Total Air Voids" field in the open graded Spreadsheet. Enter the average percent compaction for the wearing course. Use the mean value from StatSpec.

Enter the Sheet Total (either positive or negative) on the progress estimate to assess the ACP Smoothness price adjustment.

At the completion of the Project, all ACP Smoothness price adjustments must be listed on the Final Materials Certification, form 734-1979. [Refer to Chapter 12B – Quality and Chapter 37 – Submittal of Final Project Documentation.]