U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SUBJECT	FHWA TECHNICAL ADVISORY
DEVELOPMENT AND USE OF PRICE ADJUSTMENT CONTRACT PROVISIONS	T 5080.3 December 10, 1980

Par.

1. PURPOSE. To set forth procedures for development and use of price adjustment contract provisions to minimize the cost effects of price uncertainty for materials used in construction and to present sample wording successfully used in specifications by various States.

2. BACKGROUND. Price volatility of construction materials and supplies such as asphalt, fuel, cement, and steel can result in significant problems for contractors in preparing realistic bids. In many cases, prospective bidders cannot obtain firm price quotes from material suppliers for the duration of the project. This leads to price speculation and inflated bid prices to protect against possible price increases. This Technical Advisory will provide contracting authorities with information for development and application of price adjustment provisions to respond to this price volatility by transferring a portion of the risk to the contracting agency, resulting in lower bids.

3. CRITERIA FOR APPLICATION TO SPECIFIC MATERIALS AND SUPPLIES. Development and use of price adjustment provisions for specific materials or supplies should be based on the following criteria:

   a. History of prices compared to current prices reveals unpredictable, uncontrollable shifts away from normal price trends over the longer term. Agencies should attempt to determine the primary cause for the indicated price variance and assess whether that condition could be expected to exist for the foreseeable future.

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b. Price quotations from material suppliers are not obtainable for the usual term of typical contracts. Agencies should attempt to verify that suppliers ~~are~~ not withholding quotes in hopes that price adjustments will be provided.

c. Firm price quotations cannot be obtained due to shortages or prices are based on date of delivery or spot market conditions.

4. PROJECT CONDITIONS FOR USE OF PRICE ADJUSTMENTS

a. Price adjustment provisions should not be incorporated into standard specifications for permanent application to all projects. If included in standard specifications, the price adjustment should apply only when provided for in the bidding proposal for a specific project.

b. The use of price adjustment provisions for specific materials, once established using the criteria in paragraph 3, should not be adopted as a standard long-term policy for all projects. The need to include price adjustment provisions should be assessed on a project-by-project basis based on the following considerations:

(1) For single season contracts, price adjustment provisions should apply to all price-volatile materials and supplies which significantly affect the unit costs of major items. For example, fuel costs would probably have a significant effect on major items of a grade and drain project, but not on a traffic signal installation project.

(2) For multiple season contracts, all price-volatile material and supplies expected to be used should be subject to price adjustments.

(3) Whenever price adjustment provisions are adopted, their need, effectiveness, and fairness should be continually evaluated by the contracting agency. Resulting administrative problems may indicate the need for incorporating revisions; a system for feedback from industry groups is desirable.

5. DEVELOPMENT OF CONTRACT PROVISIONS. The following points should be considered when developing contract provisions for calculation and payment of price adjustments:

a. Price adjustments should apply for both upward and downward movement of prices. Typical specification wording is given below for two optional methods:

(1) . . . a price adjustment clause is being inserted into this contract to provide for either additional compensation to the contractor, or credit to the State, depending upon an increase or decrease in the average price of (material or supply); or

(2) . . . if the current price shows a decrease from the base price, resulting in a negative adjustment, deductions for decreased cost will be made only to the extent of any increased compensation previously paid under this provision.

b. Price adjustment provisions should contain a reasonable ceiling on upward adjustment, preferably in percentage form rather than in absolute dollars, and should also contain a lower limit on downward adjustment. Typical specification wording is given below for three optional methods:

(1) . . . if the current price index indicates an increase of (25 - 100 percent suggested) or more over the base price for (material), the contractor shall not perform (the applicable item) for the remainder of the project without written approval of the engineer; or

(2) . . . the maximum adjustment allowable shall be limited to a (25 - 100 percent suggested) increase from the base price for (material); or

(3) . . . it shall be understood that a price increase adjustment may cause the State to decrease the quantities of work utilizing (material). If the current price index at any time exceeds (125 - 200 percent suggested) of the base, the (agency) reserves the right to cancel the remaining portions of those items utilizing (material). Provisions providing for decreased quantities and item cancellation in this paragraph are separate and take precedence, notwithstanding any other provisions of this contract.

c. Price adjustments should be based on an index or other economic barometer which is not susceptible to manipulation by contractors and suppliers acting singly or as a group. The contracting agency should develop the index to be used, or use other government price data for each material or product. Indices can be developed from statewide or areawide data secured from appropriate sources such as manufacturers, wholesalers, or retailers. The data should be secured on the same date each month. The basis for establishing the indices used in making price adjustments should be included in the contract provisions. Examples of index source descriptions are given below:

(1) . . . the base price index will be the average of quotations from suppliers serving the area in which the project is located and will be determined at the beginning of the month in which bids are received. For the part of the State including (specify appropriate boundaries), the index will be based on quotations from (list of specific sources) . . . etc. The current index will be determined in the same manner for the (period) for which the price adjustment factor is being computed.

(2) . . . the base price index for a specific item will be determined by the average unit bid price for the specific item on accepted low bids during the 12-month period ending with the month in which bids are received. The current price index will be determined by averaging the base prices established during the adjustment period. Note: This method cannot be used for non-bid items, or for items where the bid price includes other costs such as labor, equipment, or material independent of the price trends for the specific material to be adjusted.

(3) . . . the base price index will be established by the State and included in the bidding proposal. This index will be the average of current quotations for (material) from the following sources currently supplying (material) to contractors on State highway work: (list the sources used). These quotations are the selling price per (unit) f.o.b. supplier's location. The current price index will be established by the same method on the first business day of each month following award of contract.

(4) In lieu of the contracting agency developing its own index, the following sources have been successfully used for price indexing. These sources of price information are not meant to be exclusive of any other agency, organization, or publication which now provides, or may provide in the future, the type of price information which may be useful.

(a) U.S. Department of Labor, Bureau of Labor (BLS) monthly publication titled, "Wholesale Prices and Prices Indexes." Address: BLS, Room 1539, 441 G Street, NW., Washington, D.C. 20212. (Monthly price information for virtually all construction materials and supplies.)

(b) Platt's Oilgram Price Service. $400/year, published daily. Note: for petroleum products only. Address: McGraw-Hill, Inc., 1221 Avenue of the Americas, New York, New York 10020.

(c) Engineering News-Record. $26/per year, published weekly. Address: Fulfillment Manager, ENGINEERING NEWS-RECORD, P. O. Box 430, Hightstown, New Jersey 08520. (Price information for various construction commodities in 20 U.S. and two Canadian cities - quotes approximately monthly.)

(d) The Oil Daily. $150/year, published daily. Note: for petroleum products only. Address: Lee W. Huebner, Editor and Publisher, 75 Rockefeller Plaza, New York, New York 10019.

(e) The U.S. Oil Week. $97/year, published weekly. Note: for petroleum products only. Address: Capitol Publications, Inc., 2430 Pennsylvania Avenue, NW., Suite G-12, Washington, D.C. 20037.

d. Price adjustments should be "triggered" only by a significant change in the index rather than being responsive to minor fluctuations in price. Any trigger between 3 and 10 percent should accomplish this objective. The American Association of State Highway and Transportation Officials (AASHTO) suggests a 5 percent trigger level in its publication titled, "Suggestions and Guidelines for Combating Shortages and Minimizing the Effects of Price Uncertainties for Materials and Fuel in Construction" - 1974.

e. Price adjustment computations should be performed at specified intervals, rather than as each change in price occurs. Computation on a monthly basis is suggested.

f. A "Basis of Payment" clause for each item being adjusted is necessary to adequately define the limits of application of the price adjustment. For example, if the asphalt cement in bituminous concrete mixtures may be adjusted, the basis of payment should clearly state that all other components other than the asphalt cement are compensated at the contract unit price.

g. The contractor should not be allowed any option to accept or reject price adjustment provisions in the contract. The contract's additional payment or any credit due the State for decreased prices should not depend on whether the contractor chooses to claim the difference. The adjustment calculations and payments or credits should be automatically incorporated into the normal estimate payment process.

h. Provisions for payment of actual cost increases based on receipted invoices or other documentation submitted by the contractor are not recommended because of the additional administrative and audit requirements imposed on States and contractors, and the potential for manipulation available in such cases.

i. Price adjustment provisions should provide an incentive for the contractor to complete the contract within the allotted time specified. States should limit any upward price adjustment, as a minimum, to the last current price index established within the contract time plus approved extensions, or require completion of the project at the contract prices without any adjustment applied during any unapproved time overrun.

6. ADDITIONAL CONSIDERATIONS FOR FUELS. Development of price adjustment provisions for motor fuels used in construction equipment is more difficult because fuel is usually considered to be incidental to the project and is not generally paid for directly. To provide price adjustments for fuel, a methodology for basis of payment has to be developed which estimates the amount of fuel used by a contractor in performing the work. It is important to note that the methods described below are not designed to estimate actual quantities or fuel used in construction operations, but to provide a reasonable basis for calculating a fuel price adjustment based on average conditions. The general information in paragraph 3 applies to fuel price adjustment provisions and is supplemented by the following additional considerations.

a. Fuel Usage Per Unit Method. This method estimates the amount of fuel used in accomplishment of various units of work under average conditions. The basic data for application of this method were published in Highway Research Circular Number 158 by the Highway (now Transportation) Research Board in July 1974 (Attachment 1). Additional fuel factors developed by States for use in fuel price adjustment clauses are given in Attachment 2.

(1) For each non-structural unit of work (excavation, aggregates, asphaltic concrete, and portland cement concrete pavement), fuel usage factors for diesel and gasoline consumption per unit of work are given. The process involves applying the quantities of completed work to the fuel factors in the table, summing the total used for each separate item, and then applying price adjustment in accordance with the methods discussed in paragraph 5.

(2) For structural and miscellaneous work, the fuel factors are given in terms of fuel consumed per $1,000 of work.

b. Specified Total Fuel Requirement Method

(1) The contracting agency develops its own estimate of fuel required to complete the project and enters this amount in the bidding documents. The estimate can either be given in total gallons or dollars, with the base price also furnished in the proposal.

(2) This method also requires establishing a fuel allocation schedule which estimates the amount of fuel used by the contractor at various staqes of project completion. The table below summarizes the allocation schedules developed and now in use by several States.

Percentage of Work Complete	Average Fuel Used (%)	Range of Values (%)
10	10	0- 20
20	28	10- 40
30	41	20- 60
40	55	35- 70
50	65	50- 80
60	78	60- 90
70	86	70-100
80	96	80-100
90	99	90-100
100	100	100-

(3) As each increment of work is completed, the contracting agency applies the percentage of fuel used to date (less previous amounts estimated) to the total estimated fuel. The adjustment may then be calculated using the procedures contained in paragraph 5. An example follows:

(a) estimated total fuel required = 150,000 gallons;

(b) work completed as of current date = 32 percent;

(c) estimated fuel allocation for 30 percent completion = 30 percent;

(d) adjustment calculated on previous estimates = 15 percent fuel usage;

(e) fuel adjustment to be calculated = 15 percent of 150,000 gallons = 22,500 gallons; and

(f) the adjustment is then calculated by averaging the current price indices for the monthly periods since the last adjustment. (If work was performed in the months of September, October, March, and April for the work increment from 20 percent complete to 30 percent complete, the current prices for fuel for those months would be averaged and then applied against the base price to determine if an adjustment was due.)

c. Bid Item Method

(1) The bidder enters a lump sum amount for fuel cost in the proposal to construct the project. This lump sum bid is limited to a maximum amount set by the State, and must be warranted by the bidder to include all fuel to be used on the project.

(2) The lump sum item is used in determining the rank of bidders, and is a pay item in the contract.

(3) A fuel allocation schedule as described in paragraph 6b(2) is also required for the use of this method. The remaining procedure for calculating the adjustment is essentially the same as the method

in paragraph 6b, except that payment of the lump sum bid is made on progress estimates in accordance with the percentages given in the allocation schedule.

d. The Percent of Cost Method

(1) This method requires the establishment of factors for different types of projects which represent the approximate cost of fuel as a percentage of total construction cost. Attachment 3 gives ranges of percentage factors currently used in some States.

(2) The amount of fuel used is simply calculated periodically using the percentage factor applied against the actual dollar volume of work completed and paid on a progress estimate (with no retainage deducted) to establish the estimated amount (in dollars) of fuel costs expended by the contractor. The adjustment payment is then calculated using the procedures discussed in paragraph 5.

(3) The percentage method can be used to easily establish estimated fuel requirements or maximum bid amounts for the two methods described in paragraph 6b and 6c, respectively.

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Attachment 1

Number 158 Subject Areas: Transportation Administration July 1974
Construction
Construction and Maintenance Equipment

FUEL USAGE FACTORS FOR HIGHWAY CONSTRUCTION

INTRODUCTION

The Highway Equipment Committee of the Transportation Research Board at its annual meeting in January 1974 discussed the then current fuel crisis facing the construction industry. It was decided that immediate action was needed to formulate fuel usage factors which would enable computation of fuel requirements for highway construction jobs to comply with part 211.27 of the mandatory petroleum allocation regulation published in the January 15, 1974 Federal Register. The regulation reads as follows: "Any person, firm, or government agency planning to award a construction contract under competitive bidding to contractors who may be wholesale purchasers may apply to a supplier as a new end user."

"The volume shall be estimated in an amount sufficient to complete the project. Upon awarding of the contract the allocation must then be transferred to the successful bidder."

A Task Force was appointed by the committee to pursue this objective. The Task Force was assisted in this effort by the American Roadbuilders Association and the Associated General Contractors of America who mailed the questionnaires to their members and by the Federal Highway Administration whose Region 15 Office completed the data analysis.

This publication is the result of data submitted by more than 400 highway contractors in the United States in response to questionnaires mailed to more than 3,000 contractors.

GENERAL NOTES

The survey dealt only with fossil fuels.

An effort was made to analyze the data by types of terrain but in general the differences in fuel usage did not appear to be significant.

These figures are intended as guides only in making job estimates. The low, average and high factors represent figures for jobs having average conditions. Therefore, it will be necessary for an estimator to modify these factors to take into consideration peculiarities of the particular job he is estimating

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such as high altitude job sites, particularly rough terrain, heavy stop and go traffic in urban areas, or hauls longer than those indicated in the table.

The fuel usage factors in the table represent gallons of fuel required per unit of construction as shown in the units column, i.e. gallons per cubic yard for excavation and for portland cement concrete pavement, gallons per ton for aggregates and asphalt concrete and gallons per $1000 of contract costs for structures and miscellaneous construction.

Haul distances shown in the table or mentioned in the notes are one-way distances but fuel factors include sufficient fuel for round-trip travel in every case.

SPECIAL NOTES

EXCAVATION

Fuel usage factors for all excavation items include mobilization, clearing and grubbing, excavating, hauling, compacting and preparing the subgrade. "Earth excavation" includes rippable rock. "Other excavation" includes all items of excavation not covered by earth or rock excavation.

Special consideration should be given if equipment is working at elevations above 4,000 ft. Unusually wet conditions would be reason for higher fuel usage. The factors shown would be applicable for hauls up to approximately 5,000 ft. in length. Beyond this distance, equipment may be changed, and additional fuel should be added for longer hauls. For urban construction requiring truck hauling the fuel factors shown may be low.

Fuel requirements for all three excavation items include the total of *both* diesel and gasoline. Basically the loading, hauling and compacting units are diesel fueled while supporting equipment such as pickup and service trucks may be gasoline powered.

AGGREGATES

On-site aggregate production fuel usage factors are to be used only when the contractor contemplates erecting a plant to produce aggregates for a particular project. The fuel usage factors do not include fuel for drilling and shooting. If a quarrying operation is to be used, fuels for this purpose should be added. These factors include fuel for generating all electric power needed for this operation.

Fuel requirements for aggregate production include the total of *both* diesel and gasoline, since gasoline is used to power support equipment.

The usage factors for aggregate base include fuel for hauling, spreading, compacting and finishing the base.

Fuel requirements for this item include the total of *both* gasoline and diesel; however, the balance between the two factors will vary depending upon the type of

fuel used for the placing equipment.

ASPHALT CONCRETE

The fuel usage factor for asphalt concrete production includes all requirements to produce a ton of asphalt concrete, including the material handling at the plant site, drying and heating of aggregates, heated asphalt storage and generating power for all plant machinery.

In the event natural gas is used for the drying and heating of aggregates, fuel demands for diesel should be reduced appropriately. For normal projects approximately two gallons of diesel per ton of asphalt concrete should be deducted. (This deduction represents removal of 6% moisture and raising aggregate temperature 250 degrees F.)

Fuel requirements for this item include the total of *both* diesel and gasoline since gasoline is used to power support equipment.

Either fuel usage factor shown for asphalt concrete hauling represents the total fuel requirement for the item. If both gasoline and diesel haul units are used, appropriate adjustments should be made.

Either fuel usage factor shown for asphalt concrete placement represents the total fuel requirement for the item. If both gasoline and diesel units are used, appropriate adjustments should be made.

Fuel usage factors represent requirements to place asphalt concrete with a paving machine and compact it with three rollers. Needs for this operation are not substantially affected by production rates.

PORTLAND CEMENT CONCRETE PAVING

Fuel usage factors for the production of portland cement concrete include all requirements to produce a cubic yard of concrete including material handling at the plant site, batching, mixing, and generating power for all plant machinery.

Fuel requirements for this item include the total of *both* diesel and gasoline since gasoline is used to power support equipment.

The fuel usage factor for hauling portland cement concrete for paving are valid up to four miles. Since most projects are built using a job site plant, very limited data was received for hauls over four miles. Since insufficient data was received on gasoline usage, the fuel usage factor for gasoline shown in the table is a conversion from the diesel fuel factor.

Either fuel usage factor shown for this item represents the total fuel requirement for the item. If both gasoline and diesel units are used, appropriate adjustments should be made.

The fuel usage factor for portland cement concrete placement includes all fuel to spread, place, finish and cure portland cement concrete paving. The fuel usage factor is valid for form riding or slip form equipment.

Either fuel usage factor shown for this item represents the total fuel requirement for the item. If both gasoline and diesel units are used, appropriate adjustments should be made.

STRUCTURES

Fuel usage factors for structures should cover all concrete and steel structures, excluding pipe. Fuel requirements for structures include the total of *both* diesel and gasoline.

MISCELLANEOUS CONSTRUCTION

The fuel usage factors for miscellaneous construction should cover all work not covered by any previously listed items.

Fuel requirements for this item include the total of *both* diesel and gasoline.

FUEL USAGE FACTORS

Item of Work	Units	Diesel			Gasoline		
		Low	Avg.	High	Low	Avg.	High
Excavation:	Gallons/Cu.Yd.						
Earth		0.27	0.29	0.30	0.11	0.15	0.21
Rock		0.37	0.39	0.42	0.17	0.18	0.22
Other		0.33	0.35	0.38	0.15	0.16	0.18
Aggregates:	Gallons/ Ton						
Onsite Production		0.25	0.28	0.36	0.08	0.09	0.11
Aggregate Base							
0-10 Mi. Haul		0.24	0.27	0.33	0.22	0.24	0.28
10-20 Mi. Haul		0.35	0.42	0.54	0.27	0.39	0.49
Asphalt Concrete:	Gallons/Ton						
Production		1.75	2.43	3.50	0.07	0.14	0.18
Hauling							
0-10 Mi. Haul		0.28	0.33	0.34	0.35	0.43	0.53
10-20 Mi. Haul		0.30	0.49	0.56	0.35	0.58	0.89
Placement		0.08	0.14	0.20	0.08	0.14	0.22
Portland Cement Concrete Pavement:	Gallons/Cu.Yd.						
Production		0.15	0.28	0.45	0.12	0.15	0.21
Hauling		0.33	0.48	0.67		0.52*	
Placement		0.13	0.22	0.31	0.14	0.23	0.38
Structures:	Gallons/$1,000	10	19	25	10	22	35
Miscellaneous:	Gallons/$1,000	10	19	30	10	19	30

*Estimated Figure due to Insufficient Data.

INSTRUCTIONS FOR PROPER APPLICATION OF THESE FUEL USAGE FACTORS ARE CONTAINED IN THE BODY OF THIS REPORT.

SAMPLE PROJECT ESTIMATING SHEET

ITEM OF WORK	ESTIMATED QUANTITY	FUEL USAGE FACTORS FROM TABLE		PROJECT FACTOR*	ADJUSTED FACTORS		FUEL IN GALLONS	
		DIESEL	GASOLINE		DIESEL	GASOLINE	DIESEL	GASOLINE
					TOTALS			

*The project factor (determined by the estimator) is used to modify factors from the table for special job conditions such as: long hauls, altitude, stop-and-go hauls, drying highly absorptive aggregate, etc.

ADDITIONAL FUEL USAGE FACTORS DEVELOPED BY STATES

Items of Work	Units	Diesel	Gasoline	Combined
Clearing and Grubbing	Gal/Acre	-	-	200
Earthwork:				
-Excavation	Gal/C.Y.	-	-	0.25-0.30
-Borrow	Gal/C.Y.	-	-	0.25
-Borrow	Gal/Ton	-	-	0.45
-Loose Riprap	Gal/C.Y.	0.39	0.18	-
-Granular Backfill	Gal/C.Y.	1.00	0.16	-
Aggregates:				
-Base Course	Gal/C.Y.	0.82-0.88	0.55-0.57	1.30
-Base Course	Gal/Ton	0.55-0.63	0.09-0.40	0.65
-Stabilization (mixing)	Gal/S.Y.	0.04-0.044	0.028-0.03	-
-Uncrushed Base	Gal/C.Y.	-	-	0.45
-Uncrushed Base	Gal/Ton	-	-	0.25
Asphalt Concrete:				
-Pavement	Gal/Ton	2.57-2.90*	0.28-0.78	3.50
-Open-Graded	Gal/S.Y.	0.07	0.02	-
-Pavement Widening	Gal/S.Y.	0.86	0.24	-
*If natural gas is used for aggregate drying, deduct 2.00 gal/ton.				
Portland Cement Concrete Pavement:				
-Standard	Gal/S.Y.	0.11	0.15	-
-9 inch	Gal/S.Y.	0.245	0.038	-
-10 inch	Gal/S.Y.	0.272	0.042	-
-Shoulders	Gal/S.Y.	0.204	0.031	-
Miscellaneous:				
-Guard Rail	Gal/L.F.	-	-	0.23
-Concrete Barrier	Gal/L.F.	0.20	0.10	
-Lighting and Signing	Gal/$1000	-	-	15.0
-Fencing	Gal/$1000	-	-	53.0

FUEL FACTORS AS A PERCENTAGE OF TOTAL COST BY TYPE OF CONSTRUCTION

Type of Construction	Fuel Cost Percentage
Grade and drain	13-15
Grade, drain, and structures	9-10
Grade, drain, and pave	10-13
Grade, drain, pave, and structures	9-11
Surface and resurface - bituminous	9-15
Bituminous patching	11
Base and subbase	10
Portland cement concrete pavement - rural	5
Portland cement concrete pavement - urban	10
Concrete pavement patching	9
Structures and approaches - rural	5-6
Structures and approaches - urban	3-6
Deck repair, or minor widening	2
Electrical work	2
Landscaping	5
Pavement marking	1