

**VIRGINIA DEPARTMENT OF TRANSPORTATION**  
**CONSTRUCTION DIVISION (CD)**

**INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM (IIM)**

|   |                                  |
|---|----------------------------------|
| <b>GENERAL SUBJECT:</b><br><br>CONTRACT CHANGE MANAGEMENT   | <b>NUMBER:</b> IIM-CD-2013-13.01 |
| <b>SPECIFIC SUBJECT:</b><br><br>CHANGE ORDERS, FORCE ACCOUNTS,<br>CONTRACT EXPENDITURES   | <b>DATE:</b> August 1, 2013      |
|   | <b>SUPERCEDES:</b> CD-2010-1     |
| <b>APPROVED:</b><br><br>Signature On File<br>-----<br>Mark E. Cacamis, P.E., CCM<br>State Construction Engineer<br><br><b>DATE:</b> <u>August 1, 2013</u> |                                  |

DIRECTED TO – DISTRICT ADMINISTRATORS

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## I. PURPOSE

The purpose of this memorandum is to ensure good project management and accountability for all construction and maintenance contracts that are advertised, awarded, and executed through the Construction Division and that incorporate the Road and Bridge Specifications. This document sets forth the different methods of making changes to a contract, and how to proceed with each method.

## II. INTRODUCTION

### TYPES OF CONTRACT CHANGES

The amount of funds needed for a contract may change during the life of that contract due to (1) overruns and under-runs of existing contract items, and (2) changes made to the work included in the contract.

Over-runs and under-runs of existing items do not necessarily require a formal change to the contract, although that may be done, depending on the circumstances; see standard specification sections entitled, "Retention of Quantities", or "Character of Work", and "Compensation for Altered Quantities" and the Expenditure Monitoring and Control section of this document. Note that even if a formal change to the contract is not needed, attention should be paid to the fluctuation in quantities, especially in the case of over-runs, so that adequate funding is available for the work.

Changes made to the contract will take one of two forms: a Change Order or a Force Account agreement.

A Change Order is an additional agreement made between the Contractor and the Department in order to establish changes to the contract. A Change Order may be used to add, modify, or delete: pay items, contract time, or other terms of the contract.

A Bilateral (Mutually Agreed Upon) Change Order is the tool to make a contract change when both the Department and Contractor can agree upon accurate cost and time estimation. The process uses the Form C-10 to perform, communicate and integrate the required and approved change. Normally, a Change Order is signed by both parties to the contract; note that this type of Change Order is what is typically meant when the term "Change Order" is used elsewhere in VDOT publications.

A Unilateral (signed only by the Department) Change Order is used to make a contract change when both parties cannot agree upon the cost and time estimation. In these cases, the Department needs to act unilaterally to establish a cost or time adjustment. This is called a Unilateral Change Order, and the Form C-10 is also utilized for this type of Change Order.

A Force Account agreement is made with the Contractor when neither VDOT nor the Contractor can firmly establish an applicable estimate for the cost of the work, because the scope of the work is not defined (that is, when what is to be done is known, but the level of effort or quantity of materials that will be necessary to accomplish that task are unknown). In these cases the rates for the labor, equipment, and materials to be used are agreed upon in advance, and daily records are kept by VDOT in order to track the eligible expenditures. See further discussion on Force Accounts in Section III B.

It is important to note that a Force Account is not the proper tool to use when there are disagreements on the prices of work that is well defined. This is due to the facts that (1) the percent additives applied to raw labor, equipment, and material costs are greater with Force Account due to the undefined scope and (2) the production rates for Force Account may be lower. It should also be noted that Force Accounts typically place greater demands on the time of the project staff (when compared to a Bilateral Change Order).

## REASONS FOR CHANGING THE CONTRACT

The need for a Change Order or a Force Account is typically identified by project personnel or the Contractor, and may include items left out of the contract but necessary to implement the project's goals. For a list of specific reasons, refer to the code table in Trns\*port and in Appendix 2, "Change Order Checklist" in this document. It is important to note that a contract change is not to be used to implement a change solely for the convenience of the Contractor. Also, a contract change should not be pursued strictly on the basis of a cost savings being offered to the Department; what may appear to be a cost savings to the Contract may, in fact, be a long-term loss for the Department, depending on the changes to quality and the life-cycle impacts of the change.

The change must be within the scope and geographic area of the initially contracted work.

## III. GENERAL PROCEDURES

### A. CHANGE ORDER

The following steps outline the Change Order process:

1. RECOGNITION OF NEED
2. APPROVAL OF CONCEPT
3. COST & SCHEDULE IMPACT ANALYSIS
4. COMPLETION OF FORM C-10
5. APPROVAL OF CHANGE

#### 1. RECOGNITION OF NEED

The need for a change becomes known and may be initiated by VDOT, Contractor or FHWA. Caution should be exercised to ensure that the requested work is necessary for the successful completion of the project as set forth in the contract documents.

#### 2. APPROVAL OF CONCEPT

The Responsible Engineer must approve the concept prior to proceeding. Approval should be based on plans or other available data, which describes the work to be accomplished.

The concept should be coordinated with on-site personnel, project designer and/or project manager (if different individual), Contractor and appropriate District Sections. Note that communication with the project designer is particularly important, as most causes of change are found to be preventable. Effective feedback will reduce the need for future changes by establishing a process to cover lessons learned.

On federal oversight projects, the concept must be approved by FHWA prior to proceeding.

Decisions made, and the reasoning behind the decisions, need to be fully documented in writing for accurate project control.

If the scope is not well defined, a Force Account agreement should be pursued instead of a Change Order.

### 3. COST & SCHEDULE IMPACT ANALYSIS

The cost and schedule impact of the proposed change must be determined. The Contractor and VDOT shall independently develop estimates for cost and schedule impact.

- REQUEST PRICE & TIME

The Engineer will require the Contractor to provide **unit prices** for the proposed work, and any requested contract time extension. Note that an itemized cost breakdown would not be required at this point. The itemized breakdown may be necessary during the cost comparison phase.

Exception: In cases where the Contractor has requested a change in original contract item unit prices, as outlined in Section 104.02 of the Specifications, the Contractor shall justify and document the reasons for any unit price increases, which VDOT would then, in turn, analyze.

- PERFORM COST & TIME ESTIMATE

The Department must develop its own cost estimate prior to receiving the Contractor's unit price. The Engineer will develop this estimate by either (1) using bid histories for **comparable projects with comparable quantities**, if available, to develop the unit prices or (2) developing an itemized cost breakdown estimate using other industry resources. Once the Engineer has developed his own estimate, he is ready to compare to the Contractor's proposed unit prices.

Please refer to the "Contract Change Flowchart" in the Appendix for guidelines on developing proposed Change Order unit prices.

See Appendix for examples of some acceptable methods for price estimates performed by VDOT.

It should be noted that Blue Book rates are **maximum** rates. Blue Book rates are available on the internal website. The appropriate adjustment factors (year and region) should be used.

Note: For Contractor requested changes to an original contract item, since the Contractor will have to justify the reason for the proposed cost change, the Contractor's prices and supporting justification would be received first, then analyzed by VDOT.

The Department's cost estimate will be documented and submitted as part of the justification for the Change Order. When forwarding the Change Order package, include copies of: any notes, memos, or e-mail messages on file that explain the identification of the problem and its extent; documentation of communication with designer; the VDOT estimate; the Contractor's correspondence showing his price; and any notes on file made prior to, or between, discussions with the Contractor, which established VDOT's position. If the estimate was based on bid history, the projects utilized need to be noted; if the estimate was a detailed estimate, remember to include the sources of the information.

- EXTENSION OF TIME

If the Contractor requests a time extension, the proposed time extension will only be considered if the work is a controlling work item or affects the critical path for project completion.

The amount of time extension granted should be based upon an analysis of the time it should take to perform the work and how this time will impact the planned schedule. Appropriate production rates of the items in question should be used in the analysis.

Any justifiable time extension given must be included at the time the Change Order is developed.

Any time extension given on a Fixed Date contract, including time extensions in accordance with Section 108.04 of the Specifications, must be done by Change Order.

- **COMPARISON**

The cost of the change must be analyzed and justified. The result of this stage will determine the method by which the change action is handled. These methods are: Bilateral Change Order, Unilateral Change Order, or No Build (on this contract).

If the Contractor's proposed unit prices are less than or equal to 110% of VDOT's estimated prices, they are considered acceptable, and Form C-10 should be prepared and sent to the Contractor for signature.

See Appendix for examples for comparison to Contractor's submitted unit price.

If the Contractor's proposed unit prices are greater than 110% of VDOT's estimated prices, then the Engineer will need to discuss the differences with the Contractor. The Contractor should be able to explain to the satisfaction of the Engineer if the proposed work will involve a level of effort, type of equipment, or specialized skills that are not readily available and thus require a more expensive labor, equipment, or materials cost. This discussion with the Contractor may be resolved in one meeting, or may require several meetings with the Engineer checking to ensure the validity of the Contractor's position in between meetings; this will depend upon the specific circumstances of each Change Order.

Upon receiving the justification provided by the Contractor, the Department's review should include verification of the following:

- that production rates are reasonable;
- that equipment rates are not above the "FHWA rate" shown in the Blue Book;
- that materials costs are justified by supplier quote or representative invoice;
- and that labor rates correspond to wages currently paid by the Contractor.
- For any additional time to be granted, show where the affected work is found on the critical path and how the critical path is affected. On projects without a critical path method scheduling specification, include information on how the controlling item of work was affected.

If the Contractor's unit prices are determined to be unreasonable and the basis for the cost and/or time adjustment cannot be agreed upon, then: the Engineer may set unit prices that he has determined to be fair and equitable; establish a time extension, if applicable; and issue a Unilateral Change Order. The Engineer may also make a No-Build determination under this contract. (This means the work may be performed by separate contract or performed with State Forces. For federally funded projects, perform any necessary Public Interest Finding and for federal oversight projects, obtain FHWA approval.) If it is determined to issue a Unilateral Change Order, then prior to issuance, all of the supporting documents should be thoroughly checked to ensure that the Unilateral Change Order prices are indeed **reasonable and appropriate**.

The Engineer's conclusions, including the exact reasons why unit prices were judged reasonable or unreasonable, must be documented in writing and presented as support for further processing of the Change Order.

#### 4. COMPLETION OF FORM C-10

The C-10 form is titled "CHANGE ORDER".

Specific instructions for this form can be found on Directive Memorandum, "*Completion of Form C-10*".

The form must follow this procedure and be properly processed for approval(s) and distribution.

The following statement is to be used on any Bilateral Change Orders that settle Notice of Intent (NOI) to file claim. It may also be used on any other Change Order if mutually agreed upon by the Contractor and the Department:

"(Contractor's Name) and VDOT agree that this Change Order fully resolves and settles all claims, demands or damages of any kind relating to or arising out of the work set forth in this Change Order, including but not limited to delay, impact and acceleration."

#### 5. APPROVAL OF CHANGE

The appropriate authority level, as outlined in "Responsibilities & Approval Authority" within this directive must approve the completed Change Order package.

Project funding must be verified.

A Change Order is deemed to be "Approved" once the authorized Department representative signs it in the "Approved" signature block. Verbal authorization **to proceed with the work** may be given to the Contractor immediately **after written approval** of a Change Order or Unilateral Change Order. Verbal approval may be given for the Contractor to proceed with the work prior to the Change Order being executed by the Department if the Engineer is assured that funding is in place and the Contractor's unit prices are acceptable.

#### B. FORCE ACCOUNT

The Force Account is a cost accounting method for accomplishing a change that has a specific end result, but on which an accurate unit price cannot be made due to unknown scope. Force Accounts are not to be used merely because unit prices cannot be agreed upon.

On all Force Accounts, the labor and equipment rates to be used and projected production rates shall be agreed to in advance with the Contractor.

Time extensions resulting from Force Account work should be granted only if the work affects the critical path of the contract or is a controlling item of work, and should be based upon the agreed upon production rates.

When additional work is to be accomplished and paid for on a Force Account basis on FHWA oversight projects, FHWA must be contacted and must approve (which can be verbal) doing the work by Force Account **prior** to the Department entering into a Force Account agreement (Form C-115) with the Contractor. The actual

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Force Account agreement must also be sent to the FHWA for their approval. All approvals must be fully documented.

Records shall be compared and reconciled with the Contractor daily and recorded on Form C-116.

#### IV. EXPENDITURE MONITORING AND CONTROL

The contract budget is the total amount of funding available for all expenditures during the construction phase of a project. This budget is determined through a combination of internal estimates and the Contractor's bid amount. The "official" contract budget (at the time a contract is awarded) will be shown on the approved *Fund Distribution Sheet*. The contract budget is also recorded in the *Construction Expenditure Report System*. The expectation is to complete the construction phase of the project, including all contract work, within the established contract budget. The contract budget is defined as the awarded contract amount plus any amounts budgeted for contingencies, contract requirements, construction engineering, State Police work zone patrol, railroad work, and State Forces work. Change Orders, quantity overruns, changed conditions, potential claims, and costs to administer the contract all have the potential to increase total expenditures.

During the construction phase of a project, if total expenditures are projected to exceed the contract budget, a two step process must be followed \*\*:

1. Approval to Increase Contract Budget – Before additional funding can be added to the contract budget, approval of the Chief Engineer (or designee) to increase the contract budget is **required**. The approval of the Chief Engineer (or designee) to increase the contract budget is through the form C-11. (The Chief Engineer's approval to increase the contract budget for renewable type contracts is not required.) Note: Approval of the Chief Engineer to increase the contract budget does not mean that additional funding has been approved for a project, if granted; it only provides the go ahead to seek additional funding.
2. Approval of Additional Funding – If the Chief Engineer (or designee) grants approval to increase the contract budget, the District Administrator is responsible for identifying funding source(s) and securing approval of the additional funding needed to complete the construction phase of the project within the approved funding. If additional funding is approved, it will be added to the contract budget and the new total will become the current approved contract budget.

If additional funding has been added to the contract budget for a project and at a later date total expenditures are again projected to exceed the current approved contract budget, then the above two step process must be followed each time.

On projects (including maintenance) with unique UPC type funding sources, the construction phase estimate must be updated in the Project Cost Estimating System (PCES) and a formal request to transfer additional funding must be approved by the District and submitted to the Programming Division using the current appropriate Programming Division process(s).\*\*

After approval of the Chief Engineer to increase the contract budget, additional funding requests for state funded maintenance contracts with administrative UPC(s) are made through the District Maintenance Engineer. They will be responsible for ensuring that the state funds are available within their maintenance budget, that the expenditures will be within any spending plans or limits in place at the time, and for actual approval to expend additional funds. If the project has an administrative UPC, the approval of additional funding process can be documented by e-mail.

Additional funding for extra work may also come from sources other than State or Federal funds. Generally, the other sources of funding will be municipalities, utilities, or property owners. To ensure that other funding sources are billed properly, the source and amount of funding must be clearly identified and shown on the Change Order or Force Account.

The contract budget normally includes a contingency amount for unforeseen expenses or unknown factors

encountered during construction. Contingency is established at amounts appropriate for the risk of contract cost overruns to cover "**All Construction Cost Overruns**" resulting from Change Orders, Force Accounts and overruns of contract items and is typically 10% of the contract amount. The cost of all work performed by the Contractor must be monitored and controlled within the overall contract amount plus contingency. In addition, expenditures for other construction phase items such as construction engineering, State Forces, railroad, and State Police need to be monitored and controlled so that they do not exceed their budgeted amounts.

Accurate, timely reporting and analysis of expenditure status is a key to successful project management. The following procedures should be used to monitor and control costs:

1. Work that involves increased costs must be limited to only include work needed to provide a safe and fully functional facility as shown in the plans and contract documents.
2. At least monthly during the time the contract is active, the District Administrator (or designee) is responsible for ensuring that projections are made for all construction phase expenditures and for ensuring that if projected expenditures exceed the contract budget, the steps outlined in this Directive are followed. Projected expenditures as well as expenditures to date must be updated monthly in the Construction Expenditures Report System (CERS) for each contract. \*\* Also, every ninety days the construction phase cost estimate must be updated in PCES. \*\*
3. If construction phase expenditures on a project are projected to exceed the contract budget and either the Chief Engineer does not approve increasing the budget or additional funding to increase the budget is unavailable, then steps must be taken to ensure expenditures will not exceed the contract budget.

\*\* If a contract is for a project that has a financial plan (as required by Section 33.2-368 of the Code of Virginia and/or Federal requirements), then the stipulations and requirements of the financial plan must be followed in lieu of these requirements.

## **V. FHWA REQUIREMENTS**

On Federal oversight projects, it is the District Administrator's (or designee) responsibility to keep the FHWA Area Engineer fully apprised of the status of the contract, including planned changes. On non-Federal oversight projects, it is the District Administrator's (or designee) responsibility to act on behalf of the FHWA.

### **A. CHANGE ORDERS**

#### **APPROVAL**

Change Orders will follow a two-step process to obtain approval:

1. The change itself --- FHWA must be notified of the possibility of a contract change as soon as the potential need is determined. The outcome of this initial contact will be a decision by FHWA on whether the change as proposed is acceptable. Record in the justification documentation the FHWA approval to do the work. Note that on federal oversight projects, FHWA must approve the change to the work, and that approval (which can be verbal) must occur before the work is begun.
2. The cost of the change --- Although FHWA approval of the ensuing costs and time extensions are not required to occur in advance, it is advisable to pursue these in advance, in order to maximize federal participation. The FHWA approval of costs and any time extensions will be based upon their independent analysis of the Department's cost analysis, and of the Departments' justification for any time extensions. Therefore, in order to code the Form C-10 as FHWA-participating, the Department should obtain informal cost and time extension approval from FHWA before submittal of the final contract change document (Form C-10).

Informal approval of the Change Order can be achieved by submitting a draft of the Change Order with justification to FHWA as soon as practicable. FHWA comments and VDOT resolutions should then be provided as part of the final Change Order justification documentation, when the official Form C-10 is forwarded to the FHWA for signature.

The Change Order justification documentation must include documented communication between the Engineer and the Design Project Manager.

It is the District Administrator's (or designee) responsibility to ensure that any limits placed on contract changes by FHWA be followed and properly documented.

#### CODING OF FORM C-10

If VDOT has been informed by FHWA that the Change Order will be non-participating (in whole or part) that portion must be coded "non-participating".

If preliminary cost and time extension approval is not obtained from FHWA, the Form C-10 should be coded as "FHWA non-participating". If federal participation on a Change Order is coded incorrectly, the District Administrator or designee **must** make the correction and inform FHWA of the correction within 30 days of being notified that the coding is in error.

Change Orders submitted without justification documentation or with wholly inadequate justification will be returned to the District Administrator as "FHWA approved as Federal-aid non-participating". If the Change Order justification documentation is determined by FHWA to need additional information or clarification, that information should be provided to FHWA within 2 weeks from the time of notification. If the request will take longer than 2 weeks, the Department should contact the FHWA Area Engineer.

### **B. OTHER CONTRACT CHANGES**

#### TOTAL OVERRUNS GREATER THAN 25%

For any federally funded project on the National Highway System (NHS) with an original estimated cost of \$10 million **or more**, the FHWA will be notified when the actual contract expenditures plus construction engineering costs exceeds the original estimated cost\* by more than 25%.

\*Note that the original estimated cost is calculated by taking the FHWA-approved Engineer's Estimate of contract expenditures at Plans, Specifications & Estimates (PS&E), subtracting out any contingency amounts, and then adding in the estimated construction engineering costs.

The responsible charge VDOT Engineer should contact the FHWA Area Engineer.

#### FORCE ACCOUNT

When additional work is to be accomplished and paid for on a Force Account basis on FHWA oversight projects, FHWA must be contacted and must approve (which can be verbal) doing the work by Force Account **prior** to the Department entering into a Force Account agreement with the Contractor. The actual Force Account agreement (Form C-115) must also be sent to the FHWA for their approval. All approvals must be fully documented.

#### NOTICE OF INTENT TO FILE A CLAIM

The FHWA will be kept informed of the status of Notices-Of-Intent (NOI) and allowed an opportunity to provide input during the processing of the NOI.

- Notice of Intent should be sent to State Construction Engineer.

## VI. RESPONSIBILITIES & APPROVAL AUTHORITY

A Change Order or Force Account is a change to the contract, and, therefore, can only be approved by a Responsible Engineer.

### A. PROGRAMMING DIVISION

*The Programming Division will monitor and provide allocation of funding to support construction contracts. They play an "invisible" role during projects remaining on-budget.*

Once the contract budget is projected to be exceeded and an updated estimate has been entered in PCES, the Programming Division is responsible for approval of transferring additional funding if the Chief Engineer has approved increasing the contract budget. A formal request to transfer additional funding must be submitted by the District to the Programming Division using the current appropriate Programming Division process(s). \*\* (See note in Section IV on projects with Financial Plans)

The Programming Division will notify the District Administrator (or designee) and the District Planning and Investment Manager on the status of additional funding transfer requests as part of the process of updating the construction phase estimate in PCES.

### B. CHIEF ENGINEER

Once the contract budget is projected to be exceeded, the Chief Engineer is responsible for approval to increase the contract budget. A formal request for approval to increase the contract budget must be submitted using form C-11. **The C-11 should be submitted to the State Construction Engineer (or designee).**

In urgent situations where delaying the approval of a Change Order or Force Account (that upon approval will cause the **current approved contract budget** to be exceeded) will result in unacceptable safety and/or financial consequences, the Change Order or Force Account will be sent to the Chief Engineer for approval. Change Orders submitted for approval by the Chief Engineer will be signed by both the District Administrator and the Responsible Engineer on the "Recommended for Approval" lines on Form C-10 and an explanation provided outlining the financial and/or safety consequences which necessitate prompt approval by the Chief Engineer. \*\* (See note in Section IV on projects with Financial Plans)

On federally funded non-oversight projects, if the Chief Engineer decides not to approve a request to increase the contract budget, or a Change Order or Force Account that will cause the current approved budget to be exceeded, FHWA is to be notified of the situation.

The State Construction Engineer (or designee) will review Change Orders or Force Accounts exceeding the **current approved contract budget**. If recommended for approval, they are to be forwarded to the Chief Engineer. The Chief Engineer is furnished the original documentation covering the change; including the Department cost analysis and justification for any associated time extension.

If and when any Change Order or Force Account work is approved by the Chief Engineer (or designee), additional funding must still be secured as needed to ensure total expenditures do not exceed the contract budget.

### C. DISTRICT ADMINISTRATOR

The District Administrator and/or their designee(s) may approve all Change Orders, Unilateral Change Orders

and Force Accounts, along with associated time extensions, within the **current approved contract budget** and authorize the work to be performed.

The District Administrator is responsible for compliance with this policy. District Administrators may delegate signature authority to one or more designees provided that each designee is a Responsible Engineer (Professional Engineer). The District Administrator may elect to provide various levels of signature authorities. Delegation of signature authority must be in writing and kept on file. The District Administrator may or may not be eligible to serve as the Responsible Engineer depending on whether or not he is a Professional Engineer.

**The District Administrator is responsible for ensuring that the added work is within the scope and geographic area of the initially contracted work prior to processing.**

Scope is defined as work similar in nature to that specified in the original contract and necessary for the facility to function as intended in the original documents. For construction and maintenance contracts, geographic area is defined as the area within the limits of the project as outlined in the contract documents. For maintenance schedules, such as plant mix, surface treatment, or slurry seal, geographic area is defined as the County(s), City(s), or Town(s) within which the original contract work is located.

The District Administrator (or designee) will review all Change Orders, Unilateral Change Orders, or Force Accounts along with supporting documentation. The District Administrator (or designee) shall also review cost analysis, budget verification and time extension for acceptability.

If FHWA concurrence is required, the District Administrator (or designee) is to send the FHWA the original Change Order and one copy of the Form C-10 with justification documentation, including the Department's cost analysis for FHWA approval (retain one copy of Form C-10 and documentation until original is received back from FHWA). The District Administrator (or designee) is to follow up with the FHWA within two (2) weeks to assure prompt response.

The District Administrator (or designee) is responsible for contacting the VDOT Design Project Manager. This input shall be documented and forwarded as part of the Change Order submission. If there is not a Design Project Manager, the initiator of the contract shall be contacted.

On projects (including maintenance) with unique UPC type funding sources, the District Administrator (or designee) is responsible for updating the construction phase estimate in PCES, coordination with the District Planning and Investment Manager to identify the needed funding based on the contract budget increase, and submission of the transfer request to Programming Division using the current appropriate Programming Division process(s). \*\* (See note in Section IV on projects with Financial Plans)

The District Administrator (or designee) is to assure complete, accurate, and timely preparation and communication of the Change Order package. This communication shall inform all involved throughout the entire process ending in final approval and authorization of work.

The District Administrator (or designee) shall assure final Change Order package distribution.

The District Administrator (or designee) will be responsible for forwarding copies of all Notice-Of-Intent (NOI) to file a claim by Contractors to the FHWA on all oversight projects and for entering NOI's into the Department's Site Manager NOI tracking system.

## **VII. DISTRIBUTION OF APPROVED CHANGES**

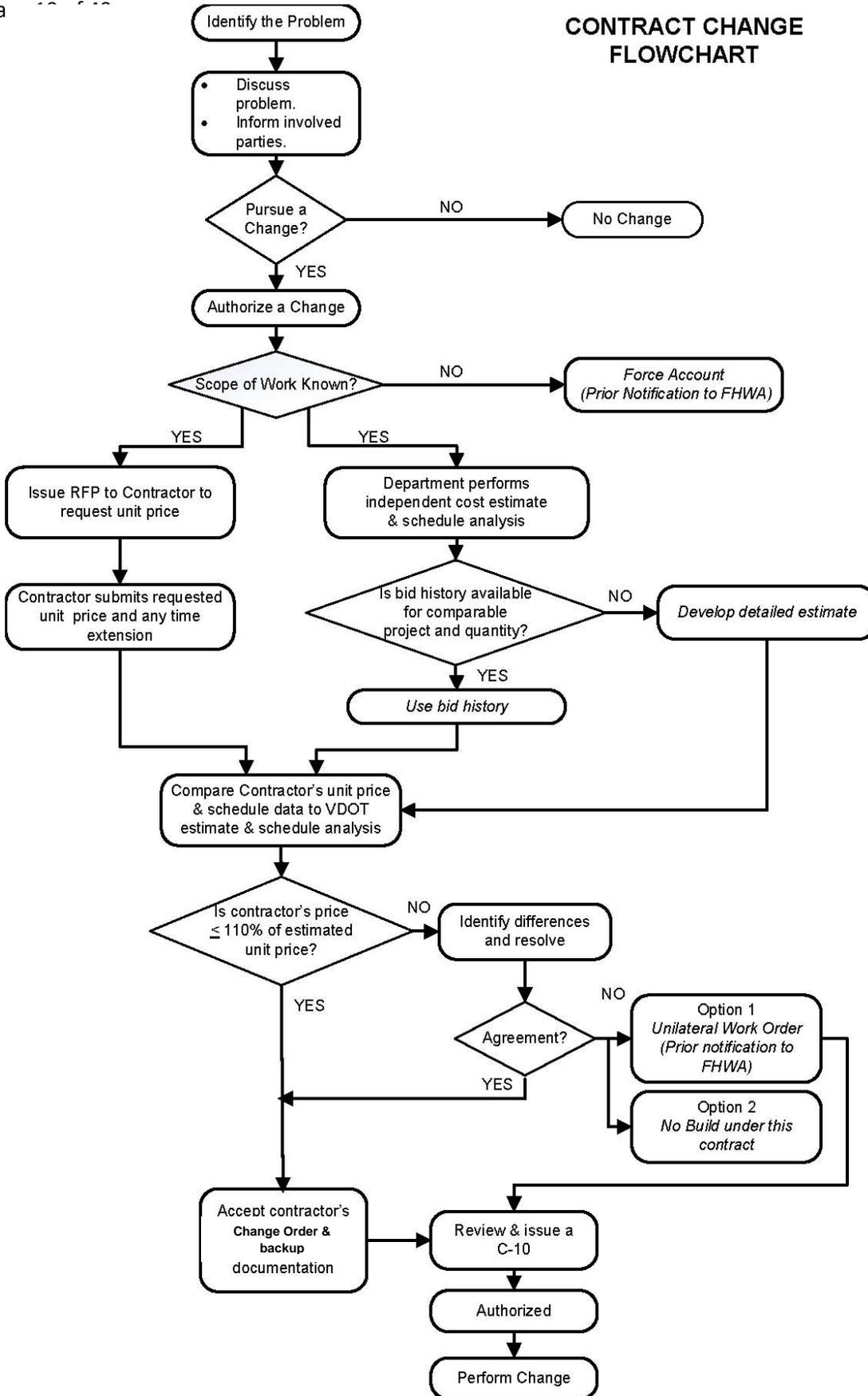
The transmittal of the completed original Change Order, Unilateral Change Order or Force Account documentation and copies of the signed "Approved" Change Order are distributed as follows:

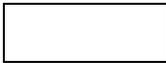
Construction Division – Electronic copy of Signature page and Totals page to be sent electronically to the Project Closeout/Final Payment Administrator.

Design Project Manager - One copy of Form C-10 and documentation if Change Order resulted from a plan discrepancy. Documentation to include a separate memorandum with recommended consultant's cost responsibility, when applicable.

District – Distribution is to be determined by District procedures. The District Administrator should determine if additional copies of Form C-10 and supporting documentation are needed for third party distribution.

### CONTRACT CHANGE FLOWCHART





**VIRGINIA DEPARTMENT OF TRANSPORTATION**  
DISTRICT \_\_\_\_\_  
**WORK ORDER CHECKLIST**

Contract ID : \_\_\_\_\_ Date: \_\_\_\_\_  
Project # : \_\_\_\_\_ **CHANGE ORDER CHECKLIST** \_\_\_\_\_  
FHWA # : \_\_\_\_\_

**Available Funding:**

|                                  |          |                                   |          |
|----------------------------------|----------|-----------------------------------|----------|
| <b>Original Contract Amount</b>  | \$ _____ | <b>Original Contract Amount</b>   | \$ _____ |
| <b>+Construction Contingency</b> | \$ _____ | <b>+Previous Work Orders</b>      | \$ _____ |
| <b>+Original CEI</b>             | \$ _____ | <b>+Projected Over/Underruns</b>  | \$ _____ |
| <b>=Original Budget Amount</b>   | \$ _____ | <b>+Projected CEI</b>             | \$ _____ |
|                                  |          | <b>=Projected Total Needed</b>    | \$ _____ |
| <b>Original Budget Amount</b>    | \$ _____ | <b>\$ Needed for this W.O.</b>    | \$ _____ |
| <b>-Projected Total Needed</b>   | \$ _____ | <b>Has funding been obtained?</b> | \$ _____ |
| <b>=Amount Available/Deficit</b> | \$ _____ |                                   | \$ _____ |

**Source of Funding:**

Participation: State \_\_\_\_\_ % FHWA \_\_\_\_\_ % Other \_\_\_\_\_ %

Work Order Charge Line(s) \_\_\_\_\_

Attached:

- Original Work Order (Form C-10)

**Change Order Charge Line(s)**

**Cost** Original Change Order (Form C-10)

VDOT Independent Estimate:

- VDOT Detailed Estimate or
- Bid History

If follow up reassessment was necessary:

- Documentation attached

**Time Extension Justification Required:**

- Itemized request from Contractor
- VDOT evaluation
- Statement that work is on critical path or controlling item
- Days allowed as full settlement for extra work? \_\_\_\_\_ Days Allowed





Category and Responsibility for Work Order: Pick one category related to the most significant item on Work Order (To be designated in Section II of Form C-10)

- UTIL Delays caused by utility issues
- CHAR Changes per Section 104.2 (Character of Work)
- ADD Additional work not originally planned
- PLAN Plan error or omission
- CONT Error or omission in contract document
- VALU Contractor Value Engineering Proposal
- LEG Local, State or Federal government proposal
- POL Changes in VDOT Policy
- VDOT Late NTP or VDOT caused delay
- MISC Does not fit into other categories
- NBID Items specified in contract with set unit price, not bid on by Contractor
- RENW Renewing/Extending time limit on a renewable contract

Explanation (See C-10 for additional detail):

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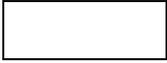
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**WORK ORDER ESTIMATE**  
USING COMPARABLE PROJECTS WITH COMPARABLE QUANTITIES

Performed by \_\_\_\_\_ Date \_\_\_\_\_

Contract ID: \_\_\_\_\_ Work Order No.: \_\_\_\_\_  
State Project No.: \_\_\_\_\_ FHWA No.: \_\_\_\_\_

\_\_\_\_\_ District bid history used.

**ITEM (include quantity):** \_\_\_\_\_

| Project:<br>( w/ quantity) | LOW BID PRICE | 2 <sup>nd</sup> bidder<br>Price | 3 <sup>rd</sup> bidder<br>price |
|----------------------------|---------------|---------------------------------|---------------------------------|
|                            |               |                                 |                                 |
|                            |               |                                 |                                 |
|                            |               |                                 |                                 |
|                            |               |                                 |                                 |

CALCULATIONS:

EXPLANATION:  
[Must justify if using other than own District bid history]

**COST COMPARISON**

Contractor's unit price: \_\_\_\_\_ Date received: \_\_\_\_\_

Contractor's price \_\_\_\_ acceptable; \_\_\_\_ unacceptable

Action taken:



Example of VDOT work order estimate in which good District bid history of comparable quantities is available; in the follow-up cost comparison, Contractor's price accepted without additional information being required.

**CHANGE ORDER ESTIMATE**

USING COMPARABLE PROJECTS WITH COMPARABLE QUANTIITES

Contract ID: N00013758C01  
 VDOT No.: 0099-095-F14, C504

**Change Order No: 1**

FHWA No.: IM-NH-099-1(233)

Our District bid history used.

**ITEM** (include quantity): **Item 12345 1000 CY**

| Project:<br>( w/ quantity) | LOW BID PRICE | 2 <sup>nd</sup> bidder<br>Price | 3 <sup>rd</sup> bidder<br>price |
|----------------------------|---------------|---------------------------------|---------------------------------|
| Project B (990 CY)         | <b>\$1.15</b> | \$1.20                          | \$1.25                          |
| Project D (1144 CY)        | \$2.50        | <b>\$1.00</b>                   | \$1.30                          |
| Project G (1100 CY)        | <b>\$1.08</b> | \$0.90                          | \$1.45                          |

**CALCULATIONS:**

- ❶ Doing weighted average:  $990+1144+1100= 3234$ ;  
 $990/3234 \times \$1.15 = \$0.35$   
 $1144/3234 \times \$1.00 = \$0.35$  {NOTE low bid price of \$2.50 unrepresentative}  
 $1100/3234 \times \$1.08 = \$0.37$   
 TOTAL = \$1.07
- ❷ Figure limit for using Contractor's price (no more than 10% over \$1.07 calculated in Step 1)  
 $\$1.07 + (\$1.07 \times 0.10) = \$1.18$   
 Therefore, if contractor's proposed price is less than or equal to \$1.18 it may be accepted

EXPLANATION: N/A

**COST COMPARISON**

Contractor's unit price: \$1.17/ CY Date received: 3/24/06  
 Contractor's price X acceptable;      unacceptable  
 Action taken: Contractor's price acceptable and C-10 prepared and sent to contractor

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Example of VDOT work order estimate in which good District bid history of comparable quantities is available; in the follow-up cost comparison, Contractor's price accepted only after additional information is provided.

**WORK ORDER ESTIMATE**  
**USING COMPARABLE PROJECTS WITH COMPARABLE QUANTITIES**

**CHANGE ORDER ESTIMATE**  
Performed by Contractors Date 3/1/06

Contract ID: N00013758C01 Work Order No.: 2  
VDOT No.: 0099-095-F14, C504 FHWA No.: IM-NH-099-1(233)

Our District bid history used.

ITEM (include quantity): Item98765 10000 CY

| Project:<br>( w/ quantity) | LOW BID PRICE | 2 <sup>nd</sup> bidder<br>Price | 3 <sup>rd</sup> bidder<br>price |
|----------------------------|---------------|---------------------------------|---------------------------------|
| Project B (9000 CY)        | \$5.00        | \$5.50                          | \$4.90                          |
| Project D (11000 CY)       | \$4.90        | \$6.00                          | \$6.25                          |
| Project G (12500 CY)       | \$4.80        | \$6.00                          | \$6.80                          |

**CALCULATIONS:**

① Doing weighted average:  $9000+11000+12500= 32500$ ;

$9000/32500 \times \$5.00 = \$ 1.38$

$11000/32500 \times \$4.90 = \$ 1.66$

$12500/32500 \times \$4.80 = \$ 1.85$

**TOTAL = \$ 4.89 per yd<sup>3</sup> for 10,000 yd<sup>3</sup> = VDOT estimate**

② Figure limit for using Contractor's price (no more than 10% over \$4.89 calculated in Step 1)

$\$4.89 + (\$4.89 \times 0.10) = \$ 5.38$

**COST COMPARISON**

Contractor's unit price: \$5.45 CY Date received: 3/24/06

Contractor's price is >110% of VDOT's estimate; therefore, cannot accept price without justification.

**Additional Information provided by Contractor**

Contractor indicated that there are narrow working limits, slowing normal production rates.

Assessment of additional information: This is correct, but it was not factored into the VDOT estimate (since we used the straight bid values and it would not have been part of them). Obviously, some allowance should be made here; the question is whether the difference in the two estimates is commensurate with the decreased production rate.

~ Consider that the amount under consideration is the difference in a total VDOT cost estimated of  $10,000 \times 4.89 = \$48,900$ , vs. the contractor's total submitted of \$54,500, a difference of \$5600 for a work order of around \$50,000; also note that the Contractor's price is 11 ½ % over VDOT's, which is close to the 10% allowed.

~ Also, the Contractor provided a partial cost breakdown for the work order, which allowed us to check some of the equipment and labor rates vs. the weekly wage rate data and the Blue Book maximums, and no discrepancies were found.

Therefore, it was determined that the cost difference was in keeping with the decrease in the production rates,



Appendix 4-2

and the contractor's price is considered acceptable.

Contractor's price   X   acceptable;        unacceptable

Action taken: Contractor's price acceptable and C-10 prepared and sent to contractor



*Example of VDOT work order estimate in which a good District bid history of comparable quantities is not available; also, in the follow-up cost comparison, Contractor's price is accepted only after additional information is provided. Note that this example is almost identical to #4-4; the difference is the manner in which the additives are applied.*

**CHANGE ORDER ESTIMATE**

USING COMPARABLE PROJECTS WITH COMPARABLE QUANTITIES

Performed by Sam Jones Date 3/21/06

Contract ID: N00013758C01 Work Order No.: 1  
 VDOT No.: 0099-095-F14, C504 FHWA No.: IM-NH-099-1(233)

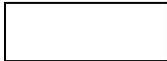
Our District bid history used.

ITEM (include quantity): *Item 99995 760 LF*  
 48" Concrete pipe with 51' cover

| Project:<br>( w/ quantity)                     | LOW BID PRICE | 2 <sup>nd</sup> bidder<br>price | 3 <sup>rd</sup> bidder<br>price |
|--|---------------|---------------------------------|---------------------------------|
| Project B (75 LF)<br>Not a comparable quantity |               |                                 |                                 |

CALCULATIONS:

EXPLANATION: When checked, bid history for comparable quantity project in this District or adjoining District was not available — found only one project with 75 LF, which is not a comparable quantity.  
 Therefore, performed detailed estimate (see next page).



Project: 0099-095-F14, C504

FHWA No.: IM-NH-099-1(233)  
Work Order No. 1  
Unit Price for 48" Concrete Pipe (51' cover)

*Note on this example: There are many ways to assemble an estimate. This example shows calculating each major element (labor, equipment, & materials) on a per LF basis, but we could also have done a subtotal cost for the given quantity and simply added up the cost of labor, cost of equipment, and cost of materials to produce that quantity of work (and then divided the total by the given quantity for a unit cost at the end).*

**A. Material Costs**

Called Xpress Concrete Products and Doright Precast to obtain quotes for 760' of pipe, including two bends (one 45° and one 30°), and mastic:

Xpress Concrete Products:

- ~ 48" X 8' Special Design Concrete Pipe @ \$230.00 per L.F.
- ~ 48" X 8' Special Design Concrete Bends @ \$2750.00 each (either 45° or 30°)
- ~ Mastic - \$0.30 per Lb.

Doright Precast:

- ~ 48" X 8' Special Design Concrete Pipe @ \$240.00 per L.F.
- ~ 48" X 8' Special Design Concrete Bends @ \$2550.00 (either 45° or 30°)
- ~ Mastic - \$0.40 per Lb.

Average:

- ~ 48" X 8' Special Design Concrete Pipe @ \$235.00 per L.F.
- ~ 48" X 8' Special Design Concrete Bends @ \$2650.00, for bends that are each 8' long;  $2650 \div 8 = \$331.25$  per L.F.

Do weighted average to get one price per LF, for 744' of straight 8' sections &amp; 16' of bends (2x 8'):

$$\frac{744' (235.00) + 16' (331.25)}{760'} = \$237.03 \text{ per LF}$$

~ Mastic - \$0.35 per Lb.

Per suppliers, typical is apx. 60 lbs. per joint; that = \$21.00 per joint; divided by 8' length pipe section = an additional \$2.63 per L.F. of pipe

Subtotal 48" pipe materials cost =  $237.03 + 2.63 = \$239.66$  per LF**Material Summation**

|                           |                  |   |
|---------------------------|------------------|---|
| Average Price from quotes | \$239.66         | Pipe (including straight pipe, bends, & mastic)   |
|                           | \$ 7.19          | Assume 3% Pipe Breakage Allowance (0.03 x 239.56) |
|                           | \$ 10.79         | Sales Tax (0.045 x 239.56)                        |
| <b>SUBTOTAL:</b>          | <b>\$ 257.64</b> | <b>per L.F. Materials Cost</b>                    |

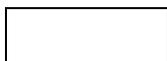
**B. Equipment costs**

Used equipment list from SiteManager (submitted by Contractor); have confirmed that Equipment rates are less than "FHWA rate" in Blue Book (using regional and equipment age adjustment factors):

HYD. EXAV., C245, 3CY, 325 HP, C.M. @ \$130.27/HR X 8 HR/DAY = \$1,042.16/DAY

Walk-behind tamper, wacker W74 @ \$6.73/HR X 8 HR/DAY = \$53.84/DAY

Vib. roller, 46" drum, 32 HP @ \$11.86/HR X 8 HR/DAY = \$94.88/DAY



Appendix 4-2

|   |                      |
|---|----------------------|
| Misc. hand tools @ \$11.00/HR X 8 HR/DAY =                | \$88.00/DAY          |
| Truck, tandem dump, 12T LD. @ \$36.94/HR x 8Hr/ Day =     | \$295.52/DAY         |
| 2 Pickups, 4 X 2, ¾ TON, 130 HP @ \$5.01/HR x 8 Hr/ Day = | \$80.16/DAY          |
|   | Total \$1,654.56/DAY |

Production Rate: Assume a basic production rate of 130 L.F per day based upon review of *RS Means Heavy Construction Cost Data*. Need to adjust that value to take into consideration unusual depth of the pipe; after discussions with several experienced inspectors, determined that a reasonable production rate reduction would be 20%; so use 80% of 130 = 104 LF per day.

Therefore: \$1654.56/day x 1day/ 104 LF = \$15.91 / LF

SUBTOTAL = \$15.91/LF Equipment Cost

C. Labor Costs (Used certified payrolls for appropriate rates)

|  |                    |
|--|--------------------|
| Excav. & loader operator @ \$11.53/HR X 8 HR/DAY = | \$92.24/DAY        |
| Foreman @ \$15.00/HR X 8 HR/DAY =                  | \$120.00/DAY       |
| 3 laborers @ \$8.12/HR X 8 HR/DAY =                | \$194.88/DAY       |
| Pipelayer @ \$9.05/HR X 8 HR/DAY =                 | \$72.40/DAY        |
| Roller operator (rough) @ \$9.31/HR X 8 HR/DAY =   | \$74.48/DAY        |
| Truck driver, rear axle @ \$9.44/HR X 8 HR/DAY =   | \$151.04/DAY       |
|  | Total \$705.04/DAY |

Carrying forward with assumed production rate of 104 L.F. per day gives us:  
 (\$705.04/day) x (1 day/ 104 LF) = \$6.78/ LF raw labor costs (for basic hourly wages)

Adding costs of benefits and other payroll costs (such as social security, workman's comp, & insurance)\*:  
 Estimate 34% based on Means values for these various elements, \$6.78 x 1.34 = \$9.09/ LF

*\*Note on this example: There are a variety of ways to figure the additives for labor. This example shows splitting up the additives such that all of the costs to make payroll (i.e., any fringe benefits to the employee as well as social security & workman's comp) are included in with the labor element, and the overhead & profit are added at the end to the combined labor, equipment, & materials costs, since general overhead as well as profit should be about the same for all elements of the work. However, while this should typically produce a fairly accurate estimate, it should be noted that this is a bit simplistic, since (1) Contractors vary on the extent to which any benefits (vacation, insurance, etc.) are provided to employees, (2) overhead in reality does vary to some extent for different labor classifications, and (3) some companies consider workman's comp and social security taxes to be a type of overhead — note that RS Means Heavy Construction Cost Data shows a method of calculating labor additives which assumes a base labor rate that already includes "fringes" that are limited to any employer-paid benefits such as vacation pay, health insurance, and pension, and then to that base rate, a combined additive which includes workman's comp, social security taxes, overhead, and profit is added to labor separately from the overhead & profit that is applied to the equipment and materials; the combined percent additives for highway work shown in Means range from about 48% for concrete finishers to 81% for welders, with an overall average of 57%. If the method used to figure additives for a VDOT estimate includes combined percentages for labor, with overhead & profit being added separately to labor, equipment, and materials, then in no case shall*



those percentages exceed the percentages allowed by the Force Account procedures, and they should typically be considerably less.

SUBTOTAL = \$9.09/LF Labor Costs

D. TOTAL

|                      |  |
|----------------------|--|
| \$257.64 / LF        | Materials  |
| \$ 15.91 / LF        | Equipment  |
| \$ 9.09 / LF         | Labor  |
| \$282.64 / LF        |  |
| \$ 56.53 / LF        | 20% Overhead & Profit (Based upon R.S. Means value for size of project |
| <u>\$339.17 / LF</u> | <u>TOTAL for estimated quantity of 760 LF of 48" concrete pipe</u>     |

COST COMPARISON

Contractor's unit price: \$345.00/LF Date received: 3/24/06

Additional information from discussions with Contractor

VDOT cost analysis did not include:

- ~ Core drill for 48" pipe to receive 8" outlet pipe from spring boxes
- ~ Repair of lifting holes
- ~ Cost of transporting pipe to pipe trench and access to 48" pipe location (not included in equipment and labor costs)

Assessment of Additional Information:

~ Of the three factors listed by the Contractor, the core drilling and the transporting are correct and warrant consideration; the repair of the lifting holes is routine and should be part of the work performed by the laborers which is already incorporated into the production rate used (and the materials necessary for that are miniscule).

~ The difference in the amounts proposed for the 760' quantity is  $760 \times \$339.17 = \$257,769.20$  from VDOT estimate, vs.  $760 \times \$345 = \$262,200$  from Contractor, a difference of \$4430.8 for additional work costing over \$250,000. Based on my experience, and with discussions with my senior inspector, we are confident that the two factors that should have been included in VDOT's estimate, but were not, would add up to more than \$4430.80 if we were to take the time to calculate that value. Therefore, no further calculation necessary and the Contractor's price is considered acceptable.

Contractor's price  X  acceptable;   unacceptable

Action taken: Contractor's price is supportable; therefore price acceptable and C-10 prepared and sent to contractor for 760 LF of 48" RCP at \$345.00 per LF, total \$262,200.00.

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*Example of VDOT work order estimate in which a good District bid history of comparable quantities is not available; also, in the follow-up cost comparison, Contractor's price is accepted only after additional information is provided. Note that this example is almost identical to #4-3; the difference is the manner in which the additives are applied.*

**CHANGE ORDER ESTIMATE**  
USE COMPARABLE PROJECTS WITH COMPARABLE QUANTITIES

Performed by Sam Jones Date 3/21/06

Contract ID: N00013758C01 Work Order No.: 1  
 VDOT No.: 0099-095-F14, C504 FHWA No.: IM-NH-099-1(233)

Our District bid history used.

ITEM (include quantity): *Item 99995 760 LF*  
 48" Concrete pipe with 51' cover

| Project:<br>( w/ quantity)                     | LOW BID PRICE | 2 <sup>nd</sup> bidder<br>price | 3 <sup>rd</sup> bidder<br>price |
|--|---------------|---------------------------------|---------------------------------|
| Project B (75 LF)<br>Not a comparable quantity |               |                                 |                                 |

CALCULATIONS:

EXPLANATION: When checked, bid history for comparable quantity project in this District or adjoining District was not available -- found only one project with 75 LF, which is not a comparable quantity.  
 Therefore, performed detailed estimate (see next page).

Project: 0099-095-F14, C504

FHWA No.: IM-NH-099-1(233)  
Change Order No. 1  
Unit Price for 48" Concrete Pipe (51' cover)

*Note on this example: There are many ways to assemble an estimate. This example shows calculating each major element (labor, equipment, & materials) on a per LF basis, but we could also have done a subtotal cost for the given quantity and simply added up the cost of labor, cost of equipment, and cost of materials to produce that quantity of work (and then divided the total by the given quantity for a unit cost at the end).*

A. Material Costs Called Xpress Concrete Products and Doright Precast to obtain quotes for 760' of pipe, including two bends (one 45° and one 30°), and mastic:

Xpress Concrete Products: ~ 48" X 8' Special Design Concrete Pipe @ \$230.00 per L.F. ~ 48" X 8' Special Design Concrete Bends @ \$2750.00 each (either 45° or 30°) ~ Mastic - \$0.30 per Lb.

Doright Precast:

- ~ 48" X 8' Special Design Concrete Pipe @ \$240.00 per L.F.
- ~ 48" X 8' Special Design Concrete Bends @ \$2550.00 (either 45° or 30°)
- ~ Mastic - \$0.40 per Lb.

Average:

- ~ 48" X 8' Special Design Concrete Pipe @ \$235.00 per L.F.
- ~ 48" X 8' Special Design Concrete Bends @ \$2650.00, for bends that are each 8' long;  $2650 \div 8 = \$331.25$  per L.F.

Do weighted average to get one price per LF, for 744' of straight 8' sections & 16' of bends (2x 8'):

$$\frac{744' (235.00) + 16' (331.25)}{760'} = \$237.03 \text{ per LF}$$

~ Mastic - \$0.35 per Lb. Per suppliers, typical is apx. 60 lbs. per joint; that = \$21.00 per joint; divided by 8' length pipe section = an additional \$2.63 per L.F. of pipe

Subtotal 48" pipe materials cost =  $237.03 + 2.63 = \$239.66$  per LF

Material Summation

Average Price from quotes \$239.66 Pipe (including straight pipe, bends, & mastic)  
 \$ 7.19 Assume 3% Pipe Breakage Allowance (0.03 x 239.56)  
 \$ 10.79 Sales Tax (0.045 x 239.56)  
 Total: \$ 257.64 per L.F. Materials Cost

Since I do not have access to any estimating tools (like that Means book), and I don't have any specific information on this contractor's costs, then I have no way to figure the overhead and the profit (or the labor additives when I get to that), so in absence of any other tools, I am going to use the maximum percentages allowed by Force Account procedures, as laid out in section 109.05. So, for the materials, will add the maximum 15% for overhead and profit:

$$\underline{\underline{\text{SUBTOTAL} = (\$257.64 \text{ per LF}) \times 1.15 = \$296.29 \text{ per LF for Materials}}}$$

*Note on this example: Regarding the 15% allowed via Force Account procedures for Overhead & Profit, this is a reasonable percentage for Change Order estimates also; various resources allow 5~10% each for Overhead*

*and for Profit, when estimating extra work. That is, the % applied for O&P is not necessarily one of the "premium" aspects of FA work.*

B. Equipment costs

Estimate that he will need these pieces of equipment:

Hyd. Excav., C245, 3CY, 325 HP, C.M.  
 Walk-behind tamper, wacker W74  
 Vib. roller, 46" drum, 32 HP  
 Misc. hand tools  
 Truck, tandem dump, 12T LD  
 2 Pickups, 4 X 2, ¾ TON, 130 HP

The Contractor has all of this readily available, except for the excavator with the 3 CY bucket. He does not own one of those. He does own one with a 2 CY bucket, and you could argue that he could do the work with that one, but since all of the other pipe items & major excavation work is finished, he sent that one to a job in North Carolina last month. The only one he still has on the job is the one with the 1 CY bucket and it is definitely too small for this work. So, will have to estimate the invoice costs of a rented piece of Equipment:

Called (1) Dapper Dan the Equipment Man, who quoted me a cost of \$992.00 per day, and (2) Delmar's Equipment Rentals, who quoted me a cost of \$1,092.32 per day. Average of those two is \$1042.16 / day. Since I am using the force account percentages in the absence of any other information, then need to apply the maximum 15% for overhead and profit on the one piece of rented equipment; so instead of \$1042.16 per day, will use  $(1042.16) \times 1.15 = \$1198.48$ .

For the other equipment, used the list from SiteManager (submitted by Contractor); have confirmed that Equipment rates are less than "FHWA rate" in Blue Book (using regional and equipment age adjustment factors):

HYD. EXAV., C245, 3CY, 325 HP, C.M., each day' rental = \$1,198.48/ DAY

Walk-behind tamper, wacker W74 @ \$6.73/HR X 8 HR/DAY = \$53.84/DAY

Vib. roller, 46" drum, 32 HP @ \$11.86/HR X 8 HR/DAY = \$94.88/DAY

Misc. hand tools @ \$11.00/HR X 8 HR/DAY = \$88.00/DAY

Truck, tandem dump, 12T LD. @ \$36.94/HR x 8Hr/ Day = \$295.52/DAY

2 Pickups, 4 X 2, ¾ TON, 130 HP @ \$5.01/HR x 8 Hr/ Day = \$80.16/DAY Total \$1,810.88/DAY

Production Rate: Assume a basic production rate of 130 L.F per day based upon records from previous job, where we had an item for 48" RCP that was similar but not quite so deep; spot checked diaries to calculate a production rate (records were still available at the District). Need to adjust that value to take into consideration unusual depth of the pipe; after discussions with several experienced inspectors, determined that a reasonable production rate reduction would be 20%; so use 80% of 130 = 104 LF/ day.

Therefore:  $\$1,810.88/\text{day} \times 1\text{day} / 104 \text{ LF} = \$17.41 / \text{LF}$

SUBTOTAL = \$17.41 per LF for Equipment

*Note on this example : Regarding the 15% allowed via F.A. procedures for Overhead & Profit for rental*

*equipment (ie, for equipment not already covered by Contractor's usual overhead & profit margin), this is a reasonable percentage for Change Order estimates also; various resources allow 5~10% each for Overhead and for Profit, when estimating extra work. That is, the % applied for O&P is not necessarily one of the "premium" aspects of FA work; it is the individual equipment rates that are considered premium.*

C. Labor Costs (Used certified payrolls for appropriate rates)

|  |                     |
|--|---------------------|
| Excav. & loader operator @ \$11.53/HR X 8 HR/DAY = | \$92.24/DAY         |
| Foreman @ \$15.00/HR X 8 HR/DAY =                  | \$120.00/DAY        |
| 3 laborers @ \$8.12/HR X 8 HR/DAY =                | \$194.88/DAY        |
| Pipelayer @ \$9.05/HR X 8 HR/DAY =                 | \$72.40/DAY         |
| Roller operator (rough) @ \$9.31/HR X 8 HR/DAY =   | \$74.48/DAY         |
| Truck driver, rear axle @ \$9.44/HR X 8 HR/DAY =   | <u>\$151.04/DAY</u> |
|  | Total \$705.04/DAY  |

Carrying forward with assumed production rate of 104 L.F. per day gives us:  
 (\$705.04/day) x (1 day/ 104 LF) = \$6.78/ LF raw labor costs (for basic hourly wages)

Since I am using the force account percentages in the absence of any other information, then need to apply: (1) the maximum 45% for administrative costs (overhead, both field & home office), profit, and fringe benefits (any vacation, health insurance, etc.); and (2) the maximum 25% for additives required to make payroll (workmen's comp, "unemployment", social security taxes, etc.). So, for the labor, will add 70% to the raw labor costs:

SUBTOTAL = (\$9.09 per LF) x 1.70 = \$15.45 per LF for Labor

D. TOTAL

\$296.29 / LF Materials (inclusive)  
 \$ 17.41 / LF Equipment (inclusive)  
\$ 15.45 / LF Labor (inclusive)  
 \$329.15 / LF

**\$329.15 / LF TOTAL for estimated quantity of 760 LF of 48" concrete pipe**

*Note on this example: Compare this example to example 4-3. The two are very close, largely because the vast majority of the cost of the proposed work is the materials: Expl. 4-3 produced a slightly higher VDOT estimate (\$339.17 per LF) because that method used 20% for [combined] O&P on all elements, so with the high material cost, the change in 15% O&P vs. 20% O & P was significant. Contrast this situation with, for example, a case of extra work that calls for inexpensive materials but is very labor intensive; the premium 70% additive allowed by FA can make a significant difference in such cases.*

**COST COMPARISON**

Contractor's unit price: \$345.00/LF Date received: 3/24/06

Additional information from discussions with Contractor

VDOT cost analysis did not include:

- ~ Core drill for 48" pipe to receive 8" outlet pipe from spring boxes
- ~ Repair of lifting holes
- ~ Cost of transporting pipe to pipe trench and access to 48" pipe location (not included in equipment and labor costs)

CD-2010-1

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Appendix 4-2

Assessment of Additional Information:

~ Of the three factors listed by the Contractor, the core drilling and the transporting are correct and warrant consideration; the repair of the lifting holes is routine and should be part of the work performed by the laborers which is already incorporated into the production rate used (and the materials necessary for that are miniscule).

~ The difference in the amounts proposed for the 760' quantity is  $760 \times \$329.15 = \$250,154.00$  from VDOT estimate, vs.  $760 \times \$345 = \$262,200$  from Contractor, a difference of \$12,046.00 for additional work costing over \$250,000. Based on my experience, and with discussions with my senior inspector, we believe that the two factors which should have been included in VDOT's estimate, but were not, would add up to more than \$12,046 if we were to take the time to calculate that value, but we are not sure. However,  $12,046.00 \div 250,154.00 = 4.8\%$ , which is  $< 10\%$  that we are allowed to differ with the Contractor without having additional justification. Therefore, no further calculation necessary and the Contractor's price is considered acceptable.

Contractor's price  X  acceptable; \_\_\_\_\_ unacceptable

Action taken: Contractor's price is supportable; therefore price acceptable and C-10 prepared and sent to contractor for 760 LF of 48" RCP at \$345.00 per LF, total \$262,200.00.



COMMONWEALTH OF VIRGINIA  
DEPARTMENT OF TRANSPORTATION  
REQUEST FOR APPROVAL TO INCREASE THE CONTRACT BUDGET

Contract ID \_\_\_\_\_ UPC(s) \_\_\_\_\_

Project No. \_\_\_\_\_ FHWA No. \_\_\_\_\_

District/County: \_\_\_\_\_

To: Chief Engineer  
Attention: State Construction Engineer (or Designee),

From: District Administrator

Date: \_\_\_\_\_

This contract was awarded on \_\_\_\_\_

The Total Original Contract Budget at Award \$ \_\_\_\_\_

To date, additional funding of \$ \_\_\_\_\_ (enter \$ 0 if applicable) has been added to the total original contract budget.

(Note: If C-11's have been previously submitted for this contract, attach copies of each previous one whether approved or not.)

Our latest projection is for the total construction phase expenditures on this project to exceed the current approved contract budget by \$ \_\_\_\_\_. In accordance with CD-2010-1, I am requesting your approval to increase the contract budget, which will require additional funding.

Explanation of reason(s) for increasing the contract budget:

If you approve this request for increasing the contract budget (and if this project has a unique UPC(s) funding source), I will identify the needed funding, update the estimate in PCES, and submit a transfer request to the Programming Division to assure the construction phase estimate is fully funded. If you deny my request to increase the contract budget, I will take the necessary step(s) to stay within the contract budget.

Approved \_\_\_\_\_ Not Approved \_\_\_\_\_

Chief Engineer \_\_\_\_\_  
*Signature*

Original: Project File