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CHAPTER 1

RESPONSIBILITY AND AUTHORITY

1.1 PURPOSE AND SCOPE OF MANUAL

This manual is published by the Western Federal Lands Highway Division primarily as a resource for construction engineering personnel. It is intended as instruction for administering Federal Lands highway projects and the guidance applies to both FHWA and contracted construction management personnel. The guidance provided by this manual is intended to identify desired results, establish standardized requirements, and provide region-wide uniformity in the administration and construction of transportation related contracts.

The guidance presented by this manual complements the requirements of the *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects* (FP). Information in this manual does not supersede the *Construction Management for Highways/Bridges Contract*, or the Delegation of Authority letters. The manual does not contain detailed discussions of all technical areas of construction engineering. To effectively perform their responsibilities, users should also refer to resources such as the *FLH Field Materials Manual*, the *Manual on Uniform Traffic Control Devices (MUTCD)*, various publications by AASHTO, ASTM, the Federal Acquisition Regulations, and construction industry standards.

In this manual, the term "Project Engineer" applies to both FHWA Project Engineers and contracted Construction Managers. The Construction Managers role, however, is limited as identified in the *Construction Management for Highways/Bridges Contract* and the Delegation of Authority letter.

1.2 DEFINITIONS

Construction Contract Contracting Officer (CCCO) – The Government’s representative having full authority to execute, administer, and/or terminate the construction contract. The CCCO may delegate certain responsibilities to an authorized representative.

Construction Inspector – A construction management employee responsible for performing actual field inspection work, recommending approval/rejection of materials and workmanship, monitoring labor and safety provisions, and maintaining inspection logs and records.

Construction Management Contracting Officer (CMCO) – The Government’s representative having full authority to execute, administer, and/or terminate the construction management contract and any subsequent task orders. The CMCO may delegate certain responsibilities to an authorized representative.

Construction Management Analyst (CMA) – The authorized representative (COTR) of the Construction Management Contracting Officer (CMCO) during the construction management contract and any subsequent task orders.

Construction Manager (CM) – The construction management employee responsible for ensuring delivery of the day-to-day construction management services for the duration of a construction project.

Construction Operations Engineer (COE) – The immediate supervisor of the Project Manager who is also a warranted Contracting Officer with limited contract administration delegations with respect to construction contracts.

Construction Engineer (CE) – The immediate supervisor of the COE who is also a warranted Contracting Officer with delegations for most contract administration functions.

Contracting Officer (CO) – The Agency representative having full authority to execute and administer the contract on behalf of the Government, or a warranted delegate of that official who has been delegated some of that authority, e.g. contract administration.

As this term is used in the Standard Specifications it also includes the COTR (see below) operating within his/her delegated authority.

Contracting Officer’s Technical Representative (COTR) – The Government’s representative or representatives having authority on behalf of the Contracting Officer as provided in the delegation letter. For construction contracts this representative is the Project Manager. For construction management contracts this representative is the Project Manager and/or the Construction Management Analyst.

Contractor/Subcontractor – As used in the manual, is defined as the Contractor/Subcontractor performing the construction contract work on the project being administered.

Director of Project Delivery (DPD) – The immediate supervisor of the CE, and the person in charge of Construction and Project Development in one of the Federal Lands Highway Divisions.

Division Engineer (DE) – The immediate supervisor of the DPD, and the person in charge of one of the Federal Lands Highway Divisions.

Division Office or Division – The Federal Lands Highway Division with jurisdiction for the project. References to Federal-Aid Division Offices will be specified.

Federal Acquisition Regulation (FAR) – The uniform Federal Government-wide procurement regulations found in the Code of Federal Regulations (CFR) at 48 CFR, Chapter 1. Some parts will be made contract clauses. Others will be furnished separately to the Project Manager, depending on need.

FLH Field Materials Manual – A companion to this manual giving FLH test methods as well as policies and procedures for monitoring materials and materials related functions on construction contracts.

Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) – The industry standard for design and utilization of standard traffic control devices.

Project Manager (PM) – The authorized FHWA representative (COTR) of the Construction Management Contracting Officer (CMCO) and the Construction Contract Contracting Officer (CCCO) during the construction phase of the work.

Western Federal Lands Highway Division (WFLHD) – The FLH Division for the assigned project.

1.3 WESTERN FEDERAL LANDS HIGHWAY DIVISION OFFICE

The Western Federal Lands Highway Division operates as part of the Federal Lands Highway Program, serving the needs of Oregon, Washington, Idaho, Montana, Alaska, and Yellowstone and Grand Teton National Parks in Wyoming. WFLHD actively administers the surveying, designing and constructing of forest highway system roads, parkways and park roads, Indian reservation roads, defense access roads, and other Federal lands roads. WFLHD also provides training, technology, deployment, engineering services, and products to other customers.

Full authority for executing and administering WFLHD highway construction projects, is held by the Division Engineer. The Division Engineer delegates and assigns specific authorities and responsibilities to lower level Contracting Officers and to COTR's including the COE. The COE cannot formally re-delegate authority or responsibility.

1.4 CONSTRUCTION MANAGEMENT RESPONSIBILITIES

The Project Engineer oversees the performance of each contractor and assures that all work is constructed, inspected, and is in accordance with the contract documents. Additionally, the Project Engineer provides contract administration to ensure completion within budget and schedule constraints.

The primary functions of the Project Engineer are to verify:

- The work is constructed in accordance with the Contract documents;
- The work is performed in a safe manner, and is completed on schedule and within budget;
- Claims avoidance techniques are employed and the Contract is administered in a fair and equitable manner and contractual actions are accurately documented, and;
- The interests of WLFHD, the public, partner agencies, and other agencies are safeguarded at all times.

The use of the term “Project Engineer” throughout this manual in conjunction with an activity, action, or response does not necessarily imply that the Project Engineer is personally executing these tasks. Many functions are appropriately delegated to members of the Project Engineer’s support staff. The Project Engineer, as the senior manager at the site, retains responsibility for actions and performance of the assigned staff.

1.4.1 Project Engineer

Responsibilities of the Project Engineer are outlined in this manual.

Authority of the Project Engineer is defined in a Delegation of Authority letter provided to the Contractor. Delegation of Authority should be discussed at the Preconstruction Conference. The Project Engineer’s authority is the same as shown for the Project Manager in the delegation of authority in Section 1.4.5.

1.4.2 Construction Manager

Responsibilities of the Construction Manager are outlined in the *Construction Management for Highways/Bridges Contract* and guidance for those responsibilities is provided in this manual.

Authority of the Construction Manager is defined in a Delegation of Authority letter (Section 1.4.5) provided to the Contractor. Delegation of Authority should be discussed at the Preconstruction Conference.

1.4.3 FHWA Project Manager

The Project Manager is the Construction Managers first point of contact in most situations. The Project Manager provides the first level of oversight, and offers guidance on routine matters such as processing invoices, checking pay notes, reviewing certifications, etc. The Construction Manager also consults with the Project Manager on specifications, drawings, issues in the field, potential changes, pricing modifications, etc.

The Project Manager’s authority is outlined in the delegation of authority letter. Project Managers have

the same contractual authority as Project Engineers.

1.4.4 Construction Inspectors

Responsibilities of the Construction Inspector (CI) are outlined in the *Construction Management for Highways/Bridges Contract* and the *CI Handbook*. Authority of Construction Inspectors is defined in a Delegation of Authority letter.

1.4.5 Example Delegation of Authority Letter

Administration of this contract is assigned to the Construction Branch of Western Federal Lands Highway Division. _____, Construction Engineer, CO Warrant #_____, has the authority to perform all of the applicable contract administration functions listed in FAR 42.302(a) and (b), except:

- Assigning contract administration functions to another Contract Administration Office.
- Executing a change order or supplemental agreement, increasing or decreasing the contract amount by more than \$200,000 or contract time by more than 100 calendar days.
- Approving payment of final invoices.
- Issuing "Show Cause" or "Cure" notices as a prelude to a termination for default.
- Issuing a termination for default.
- Ordering a compensable suspension of work with estimated liability to the Government greater than \$200,000.
- Issuing a partial or complete termination for convenience of the Government.
- Ordering an increase in the penal amount of payment or performance bonds.
- Issuing a stop-work order resulting from a protest after award.
- Acknowledging a constructive change or differing site condition with estimated liability to the Government greater than \$200,000.
- Authorizing use and possession of part of work prior to acceptance with estimated liability to the Government greater than \$200,000.
- Authorizing waiver of a field pricing report for actions increasing the contract amount by more than \$500,000.
- Requiring a field pricing report for actions less than \$500,000.

_____, Construction Operations Engineer, CO Warrant _____ has authority as described for the Construction Engineer. However, actions increasing or decreasing the Government's liability are limited to \$50,000, and changes to contract time are limited to 50 calendar days. In addition, the COE has the specific contract authority to perform the following:

- Issue the Notice to Proceed.

- Agree to accept noncomplying work at a reduction in contract price.
- Approve/disapprove the use of equipment and methods deemed equivalent to those in the contract.
- Order a suspension of work for convenience of the Government, for a reasonable (noncompensable) period of time.
- Negotiate contract modifications for approval by the appropriate Contracting Officer.
- Written acceptance of all or part of the work.

_____ is the FHWA Project Manager for this project. She will establish a project office near the project area. _____ has specific contract authority to perform the following:

- Quality assurance activities including testing and inspection to assure and document compliance with the contract requirements.
- Order the correction or replacement of noncomplying work.
- Authorize the proceeding with work, which is in apparent compliance with the contract.
- Provide stakeout or other technical information, not included in the contract, but required to perform the work included in the contract; or required to fit field conditions.
- Answer technical questions of the contractor clarifying, but not changing, the contract requirements.
- Approve/disapprove contractor shop drawings and other submittals (including CPM schedules and QC plans).
- Measure or verify the quantities of work performed for the Government's receiving report.
- Approve payment of progress invoices including all components of the invoice, e.g., incentives, disincentives, retention, and liquidated damages.
- Provide written authorization to furnish and install contract work such as traffic control devices, erosion control devices, piling, equipment/labor hour items, and other work required by the contract requirements.
- Review contractor payrolls.
- Verify compliance with contract labor provisions and provide notice of noncompliance.
- Order the removal of contractor personnel performing objectionably.
- Issue stop work order for work which is not being performed in compliance with the contract or which is causing damage and/or liability to the Government.
- Prepare the Government's estimate of construction costs for a contract modification.
- Negotiate contract modifications for approval by the appropriate Contracting Officer.
- Make qualitative or quantitative judgments which are required by the contract at the site of work, e.g., determining if specific sections of guardrail can be salvaged.

- Approve operations and storage areas on Government property.
- Notify contractor of safety deficiencies and if deficiency is life threatening, suspend work until deficiency is corrected.
- Evaluate a contractor's progress with respect to approved progress schedule and request updated schedules when necessary.
- Verify compliance with subcontracting plans, provide notice of noncompliance, and assess liquidated damages for noncompliance.

If _____ is absent an alternate FHWA Project Manager will be assigned in writing.

Employees of a Construction Management firm will oversee construction operations on behalf of FHWA. The construction management firm will assign an employee as the Construction Manager (CM). The CM is responsible for ensuring delivery of the day-to-day construction management services for the duration of the construction project. This CM has specific contract authority to perform the following:

- Answer your questions clarifying, but not changing, the construction contract requirements. The CM does not have the authority to authorize deviations from the terms of your construction contract. Any variations or deviations should be brought to the attention of the CM who will bring it to the attention of the FHWA Project Manager.
- Report, in writing, observed variances from the construction contract requirements.
- Notify you if you fail to promptly remove, correct, or replace rejected construction.
- Make qualitative or quantitative judgments that are required by the construction contract (e.g. can guardrail be salvaged), but that do not change the contract requirements.
- Provide input on field fit conditions.
- Provide a list of observed items requiring completion or correction prior to final inspection or substantial completion.
- Notify you of safety deficiencies and if deficiency is life threatening, suspend work until deficiency is corrected.
- Provide stakeout, survey or other technical information, not included in the construction contract, but required to perform the work included in the construction contract, or required to fit the field conditions.
- Perform confirmation testing.
- Deliver items to you, such as reviewed shop drawings, FHWA forms, letters, etc.
- Coordinate use of Rental Equipment (Section 622) after the FHWA Project Manager orders the work in writing.
- Monitors and interacts with your representative on the day-to-day activities of the construction work.
- Receive all deliverables designated for the CO.
- Identify construction limits in coordination with the FHWA Project Manager.

- Performs quality assurance activities related to testing, inspection and construction surveying to assure and document compliance with the construction contract requirements.
- Measures or verifies quantities of work performed for the government's receiving report.
- The CM cannot accept notification from you concerning changed conditions as outlined in FAR Clause 52.242-4 *Changes*. Rather, you must submit your notification in writing to the FHWA Project Manager through the CM.
- The CM cannot accept or reject work.

If a Construction Inspector is assigned to the project under a Construction Management or Construction Inspector Services Contract the following duties apply:

- Plan and coordinate inspections with the construction contractor to minimize impacts on construction operations, and confirm that critical inspections occur as required.
- Verify that workmanship, materials and equipment installed by the construction contractor meet or exceed the requirements of the contract drawings and specifications.
- Perform overall inspection of highway and bridge related construction activities. This includes documentation of all construction contractor activities as they relate to work performed under the construction contract.
- Monitor and ensure overall project work methods for substantial compliance with permits, environmental requirements, and erosion control plan.
- Monitor and ensure the construction contractor's operations for compliance with the approved traffic control plans and determine substantial conformity with safe practices as required by the MUTCD for construction zone work operations.
- Inspect the work for substantial compliance with the construction contract requirements and industry standards for bridge and highway related work.
- Monitor and ensure the construction contractor's quality control operations to determine substantial compliance with contract requirements and the approved contractor quality control/quality assurance plan.
- Perform quality assurance activities related to testing, inspection and construction surveying to assure and document compliance with the construction contract requirements.
- Check and verify construction contractor survey work using equipment and methods capable of meeting the tolerances required in the contract.
- Provide stakeout, survey or other technical information, not included in the construction contract, but required to perform the work included in the construction contract, or required to fit the field conditions.
- Answer technical questions of the construction contractor clarifying, but not changing, the construction contract requirements.
- Measure or verify the quantities of work performed for the Government's receiving report.
- Make qualitative or quantitative judgments that are required by the construction contract at the site of work, e.g., determining if specific sections of guardrail can be salvaged.

If there is any doubt about proper authority, you should immediately contact _____ at (360) 619-_____ for clarification.

Sincerely yours,

Contracting Officer

CHAPTER 2

PROJECT START UP

2.1 OVERVIEW

This chapter contains guidelines for initial project set up. These initial project tasks are usually performed two or three weeks before the Notice to Proceed is issued.

2.2 FIELD OFFICE

Obtain a field office within a reasonably close distance to the project. Consult with the COE when selecting the office location.

Place an "Office of the Project Engineer" sign in a conspicuous place near the entrance to the office.

For projects managed by contracted Construction Managers

Specific field office requirements are provided in the *Construction Management for Highways/Bridges Contract*.

2.3 INFORMATION PROVIDED TO THE PROJECT ENGINEER

The Project Engineer should obtain the documents and information listed below at least two weeks before the Notice to Proceed. The documents listed in Section 2.3.1 and 2.3.2 will be provided in hard copy. The information listed in Sections 2.3.3 and 2.3.4 is available on the Western Federal Lands Highway Division Construction Management website.

For projects managed by contracted Construction Managers

The Project Manager will provide the documents and information to the Construction Manager.

2.3.1 Project Specific Documents and Information

- An appropriate number of copies of the Contract (Plans and SCR)
- An appropriate number of copies of the cross-sections
- Project Staking Notes
- One copy of each item listed in FAR Clause 52.236-4 (Geotech reports, etc.)
- Project Engineer's Hold File ("PE" Hold File) (**Exhibit 2.3A**)
- "Office of the Project Manager" sign
- Project Stamps
 - Received By: Date:
 - Project Name and Number
 - Accepted
 - Not Accepted
 - Entered to Record
 - Checked By: Date:

2.3.2 Manuals

- Western Federal Lands Highway Division, Construction Management Manual
- Federal Lands Highway Field Materials Manual
- Contract Inspector's Handbook
- Sample Field Note Book
- Contract Modification Manual

2.3.3 Computer Programs

- Engineer's Estimate program w/Instructions
- QL-Pay program w/instructions

2.3.4 Miscellaneous Forms and Supplies

- Electronic copies of all miscellaneous forms (eForms)
- Electronic copy of the standard letterhead

PROJECT ENGINEER (PE) HOLD FILE CHECKLIST

PROJECT DEVELOPMENT TO COMPLETE PE HOLD FILE PRIOR TO AWARD DATE

Project: _____

Prepared by: _____ Date: _____

✓=Included
AV=Avail/Not Incl
NA=Not Applicable

Document Name

◆ **AGREEMENTS:**

- Project Agreement _____
- Material Source Agreements _____
- ROW and Easement Agreements _____
- Utility Agreements _____
- Cooperating Agency Agreements _____

◆ **DESIGN BOOK INFORMATION:**

- Highway Design Standards: WFLHD-3 (design exceptions list) _____
- Quantity Support Calculations (including structures) _____
- All Correspondence _____
- Field Review Memos and Trip Reports _____
- Mail/Telephone Listing of principal contacts (Design, Environment, etc.) _____
- Design Narrative (Special Design Considerations) _____

DESIGN INFORMATION:

- ◆ Staking Books (Default accuracy settings to 2 decimal places):
 - Clearing Notes (2 copies) _____
 - Slope Stake Notes, Version 2 (2 copies)
 - Metric decimal settings to 2 places
 - US Customary decimal settings to 1 place _____
 - Staking Detail (2 copies) _____
 - XYZ Reports (All layers) (2 copies)
 - Metric decimal settings to 4 places
 - US Customary decimal settings to 3 places _____
 - Seeding Design Listing (8½" x 11") (2 copies) _____
- ◆ Horizontal Alignment Data Listings, Geopak "Describe Alignment" (8½" x 11")
 - Metric decimal settings to 4 places
 - US Customary decimal settings to 3 places _____
- ◆ Vertical Alignment Data Listings (8½" x 11") (2 copies)
 - Metric decimal settings to 3 places
 - US Customary decimal settings to 2 places _____
- Profile (22" paper) 1:1000 [1" = 100'] H; 1:100 [1" = 10'] V (2 copies) _____
- ◆ Earthwork Report (8½" x 11") (2 copies)..... _____
 - Slope Stake/Cogo Radial Stake Out (CSV Format -- Digital)..... _____
 - R/W Radial Stake Out (CSV Format -- Digital) _____
 - Excel Earthwork spreadsheet on Computer Disk _____
- ① Plotted Cross-Sections with Subgrade shots labeled: (11" x 17") (2 copies) _____
- ② Plotted Culvert Cross Sections (11" x 17") (2 copies) _____
- Right-Of-Way Plats and Plans (2 copies) _____

✓=Included
 AV=Avail/Not Incl
 NA=Not Applicable

Document Name

CONTRACT INFORMATION:

- Environmental Documents (2 copies) _____
- Geotechnical Report (2 copies)..... _____
- * Contract Package with Addenda (2 copies) _____
- * SCR in Digital Format _____
- * Telephone Question Forms _____

PROVIDED UPON REQUEST:

- Plans (34" x 22") (2 copies) (Contracts to provide) _____
- Cross Sections: Larger size _____
- Ditch Line Profile (22" paper) 1:1000 [1" = 100'] H; 1:100 [1" = 10'] V
 (2 copies) _____
- Cross Sections: (11" x 17") (Additional Copies) _____
- Working Design files in Digital Format with [Notice Letter](#) _____

- ◆ To be placed in binders
- * To be furnished 15 days after Bid opening
- ① Include within the normal plotted cross sections, all culvert cross sections (culverts designed to displace ditch and surface runoff). Cross sections should reflect excavation quantities required in the construction of catch basins, flat bottom ditches, warped cut slopes, etc... for the pipe installations. Typically these culvert cross sections would only occur at the inlet stations.
- ② Provide plotted, skewed cross sections at major culverts (>900 mm [36"]) where the drainage design is not shown on a separate plan sheet within the plans. Cross sections should reflect the final proposed road template (Geopak-Proposed Tin), to accurately determine culvert length and design.

Remarks:

Project Engineer Hold File Delivered to Project Engineer at Handoff Meeting

Received By: _____

Date: _____

Exhibit 2.3A

Project Engineer's Hold File

2.4 COORDINATION WITH WFLHD PERSONNEL

Sections 2.4.1, 2.4.2, and 2.4.3 apply to projects managed by contracted Construction Managers.

2.4.1 Contact List

The COE will provide a contact list identifying who in WFLHD or other agencies may be contacted, their role in the project, along with phone numbers and e-mail addresses. At a minimum, the list will include:

- Project Manager (when applicable)
- Construction Operations Engineer
- Contract Administration Engineer
- Construction Management Analyst
- Construction Program Assistant
- Contract Administration Specialist
- FOIA Officer
- Cross-functional team members (as necessary)
 - Design Project Manager
 - Designer
 - Environmental Specialist
 - Geotechnical Engineer or Geologist
 - Hydraulics Engineer
 - Materials Engineer
 - Structural Engineer
 - Quality Assurance Engineer
 - Final Review Engineer
 - Materials Lab Chief
 - Materials Quality Assurance Engineer
- Computer Help Desk personnel
- County contact person
- Owning agency contact person

2.4.2 Notification to WFLHD Personnel

Once the construction management team has been selected, the Project Manager should notify all pertinent WFLHD staff that a construction management firm will administer the project, and that they are likely to be contacted by the Construction Manager. The Project Manager should provide the construction management staffs' names and contact information to WFLHD staff.

2.4.3 Vancouver Mail Room

The Project Manager should request the Vancouver Mail Room attendant to provide a mailbox for each project managed by a contracted Construction Manager. Identify the mailbox with the Construction Manager's name followed by the project name.

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CHAPTER 3

CONTACTS

3.1 GENERAL

All WFLHD employees conduct should be professional, ethical, and business-like during any and all contact with representatives of the Contractor, the public, and any third parties concerned with the project.

The Project Engineer should maintain a complete list of contacts related to the project including name, agency or company, address, phone and fax number, and relationship to project. This list will expedite appropriate communication of project problems and assist new personnel assigned to the project. This list should be turned in with the final records of the project.

3.2 CONTACT WITH WFLHD REPRESENTATIVES

A WFLHD contact list will be provided to the Project Engineer for each project. The Project Engineer may contact anyone on the list for technical or other support. It is essential that the cross-functional team members be kept apprised of potential changes to the project. Other than for very minor issues, the COE should be made aware of discussions between the Project Engineer and other WFLHD contacts.

3.3 CONTACT WITH THE CONTRACTOR

The Project Engineer shall be the primary contact for authorized representatives of the Prime Contractor. Contact with Subcontractors or vendors shall only be made through, or with the consent of, the Prime Contractor. Orders, which alter the Contract or create additional liability to the Government must be in writing and must be executed (signed) in accordance with prevailing construction contract administration delegations. Except for certain minor orders, this means a warranted Contracting Officer.

3.3.1 Gifts and Favors

Integrity on the part of all construction management staff is essential. The acceptance of most gifts and favors from Contractors and others doing business with WFLHD is strictly forbidden. Federal law and regulations prohibit the acceptance of (1) unsolicited gifts with a market value of more than \$20 (\$10 for designated procurement officials) per occasion, (2) gifts of any value aggregating to more than \$50 in a calendar year, or (3) gifts of any value that are solicited, or which are associated with an expectation, stated or implied, of a return favor. It is WFLHD policy that acceptance of any gift or favor, regardless of value, which might give the appearance of impropriety is unacceptable. Gifts should therefore be avoided except in situations where refusing a small gift (such as a calendar intended as a promotional item) would embarrass either or both parties.

Staff of the designated project office must never place themselves under obligation to the Contractor, as this would impair their ability to effectively represent the Government, and might create a condition where more serious improprieties could occur. Offers of gifts, or other actions on the part of the Contractor or its representatives that could be construed as an attempt to influence the actions of a WFLHD representative, should be immediately reported to the COE. Other offers of gifts should also be reported to the COE who will advise as to a polite refusal.

3.3.2 Fraternalization

Absolute integrity is required and fraternization with personnel of the Contractor is not permitted.

3.4 CONTACT WITH COOPERATING AND OTHER AGENCIES

As soon as possible after assignment to the project, the Project Engineer should become acquainted with the local State, county, Forest Service, National Park Service, and/or other interested officials, and discuss with them any phases of the work pertinent to them.

It should be emphasized to these officials that contact with the Contractor, on Contract issues should be exclusively through the Project Engineer. However, this should not preclude them dealing directly with the Contractor on non-contract issues, such as overweight permits, pollution regulations, speeding enforcement, etc.

Local officials should also be advised of limitations in WFLHD's ability to add to, or change contract work; and such requests should be in writing and will have to be cleared by all appropriate officials.

These issues should be discussed at the Preconstruction Conference so that Contractor understands the relationship involved.

3.4.1 Forest Service

The U.S. Forest Service is one of the *Tri-Agency* group charged with overall administration of the Forest Highway Program. Therefore, Forest Service officials have legitimate interest beyond the immediate relationship of the project and its National Forest environs.

During the project development stage of the project, most of WFLHD's contact with the Forest Service will be through the Regional Forester's Office (including the Regional Engineer). During construction, the Project Engineer should be careful to avoid taking actions, making changes or making informal agreements with local officials that are inconsistent with previous agreements, unless such issues are adequately coordinated.

During the construction of a Forest Highway project, the Project Engineer and COE should maintain close liaison with the District Ranger assigned to the locality of the project. The Ranger and his/her staff may be most interested in the following: erosion control, landscape preservation, prevention of fires and damage outside the right-of-way, sources of borrow and aggregates, other matters pertaining to land use, and the preparation and disposal of merchantable timber.

In addition to visits by the District Ranger, the Forest Supervisor, Forest Engineer, Regional Engineer, and Regional Forester may also visit the project. Generally speaking, however, these officials should be encouraged to channel all requests or requirements through a single contact official designated by the Forest Service for the project.

The Project Engineer should take immediate action on all appropriate Forest Service requests that are within the scope of the Contract. Requests or instructions that are not of an emergency nature, and that would necessitate a contract modification, should be in writing and coordinate with to the COE. Requests or instructions that are of an emergency nature shall be acted on promptly; therefore the COE should be notified as soon as possible.

3.4.2 National Park Service

Since the National Park Service normally owns the highway right-of-way, adjacent property and is responsible for maintenance and operation after construction, it maintains an active interest in all phases of WFLHD Park Service projects. Normally, the Park Service is represented on the project by a designated liaison such as a landscape architect. However, the Project Engineer should also develop a good working relationship with the Park Superintendent, local Park Rangers and maintenance personnel.

Park Service requests or instructions are to be coordinated through the designated Park Service liaison. If conflicting instructions or changes become a problem, the COE should be advised so that coordination above the project level can be clarified.

3.4.3 Other Federal Cooperating Agencies

Other Federal agencies, with whom WFLHD has an active relationship include the Department of Interior's Fish and Wildlife Service and Bureau of Land Management, and the Department of Defense (DOD). The relationship of WFLHD to these agencies varies. Some are landowning agencies like the Park Service and have interest in all aspects of the project, including maintenance. Others, like DOD have a stake in programming and funding as well as the operational functioning of the project. But DOD projects are usually destined to become State or county highway with respect to maintenance. Therefore a "tri-agency" relationship is created.

Whenever a construction project is undertaken for or involving one of these agencies, the COE will ensure that the Project Engineer is aware of all necessary administrative information regarding our obligations to the agency and furnish copies to the Project Engineer as appropriate. This documentation will usually include a Memorandum of Agreement (MOA) for the project.

3.4.4 Non-Federal Cooperating Agencies

Except in National Parks and on National Parkways, States or counties in accordance with previously executed agreements generally perform the maintenance of roads constructed by WFLHD. In such cases, the maintaining agency will be asked to inspect the project prior to assuming the maintenance obligation. It is therefore important to identify these officials early in the project and to maintain a good working relationship with them. Their interest in the project will mostly focus on the technical details and maintainability rather than impact on the surrounding environment. They will also be interested in traffic control, and whether hauling might adversely impact adjacent roads. When changes are proposed which impact these technical details, maintainability and traffic operations, they should be coordinated with these officials. Their requests should be promptly honored if reasonable, and within the Project Engineer's authority. Other requests should be referred to the COE.

With respect to Forest Highways, the State highway department is another of the "Tri-Agency" group charged with overall administration of the Forest Highway program. With respect to other Public Lands highways, the Forest Service has less of a role in planning and setting priorities, but has an interest in the highway's impact on the environment. The State may also have specific assigned responsibilities for local roads in the State regardless of whether or not they are on the State system. Therefore, even if the county is the maintaining agency for a particular project, the State may also have legitimate interest and should be consulted appropriately.

The acquisition of rights-of-way across private lands is generally a function of the cooperating agencies. In some instances, only a right-of-entry or easement for a construction project will have been obtained prior to construction. In such cases, the Project Engineer should cooperate fully with appraisers and

other agents in their work of obtaining the actual right-of-way. The Project Engineer must also be aware of the limitations (if any) of the right-of-entry and attempt to maintain good relations with the property owner during construction.

The Project Engineer should also be aware of any limitation in the Government's authority to approve or agree to any work that would change the limit of construction with respect to available right-of-way. The COE should be consulted if any uncertainty develops.

3.4.5 Regulatory Agencies

A number of Federal and State agencies have regulatory responsibilities that might result in their coming onto the project and interacting with the Contractor or construction management personnel. These agencies include those responsible for water pollution control, air pollution control, occupational safety, erosion control, storm water management, or protection of endangered species.

The involvement of these Federal and State regulatory agencies has increased in recent years as a result of changes in Federal regulations requiring compliance with all local and State regulations. Most WFLHD permits allow these agencies the right to inspect the project and to review project records at any reasonable time.

In addition to diary notation, the COE should be notified of all visits, and any anticipated further action. When regulatory agencies take issue with WFLHD's compliance with permit or project agreements, COE should be advised and arrange for technical assistance from Division office specialists.

3.5 CONTACT WITH THE PUBLIC

Field personnel are in daily contact with and under the critical eyes of our ultimate customer, the public. This might include adjacent property owners, daily commuters, residents of nearby communities, tourists, groups with special environment or other interests, and representatives of various news media. For these and other reasons, it is essential that all employees strive to conduct themselves in a manner that will command respect and confidence. In addition, the importance of conducting construction in a way that facilitates cooperation with the public and minimizes the potential for complaints cannot be overstated.

In any community, information concerning highway improvement is of primary interest. From the standpoint of good public relations, it is important that information pertaining to the project be made available as soon as possible, and that it be both accurate and complete. Weekly project newsletters should be provided to all landowners along the project, plus any other interested party.

On most Park Service and similar projects where there is a single, strong cooperating agency, all questions and requests from the public dealing with the project should be referred to and coordinated by a designated cooperating agency contact. Sometimes, especially on low profile projects, the cooperating agency(s) will defer to WFLHD for routine public interaction. If the COE advises that this is the case, the Project Engineer should become acquainted with local editors, reporters, and heads of civic groups, and furnish such information of local interest as is pertinent to the project to which they are assigned. Care must be exercised to avoid the release of information concerning controversial matters or items that might be misconstrued or misunderstood. Reference to any conflict or disagreement between WFLHD and the State, county, or another Federal agency should be avoided. A statement such as the "the matter is being jointly studied" is preferred over "there is a conflict."

When the Project Engineer is specifically assigned to be the focal point of public contacts and information, the following are some guides as to the kinds of information that should be of interest to the public, along with the actions to be taken in making timely releases with the object of establishing and maintaining good public relations:

- Information concerning road closures, detours, speed restrictions, or other items related to public safety and of general interest to motorists should be given timely publicity. In some instances, sketch maps will be helpful in conveying such information.
- Refrain from stating opinions on local issues that have no connection with the project, or involve choices that are the prerogative of the local authorities.
- Questions directed to the survey crew, construction engineering crewmembers, or contract inspectors should generally be referred to the Project Engineer for an answer.
- Requests for information pertaining to matters of recognized public interest that cannot be completely answered at the project level should be promptly referred to the COE.

WFLHD is very sensitive to the public's opinion of our projects and the quality of the project delivery process. The Completed Project Survey is often requested from local officials attuned to local public opinion. The public often writes their elected officials to provide input or to voice complaints relative to our projects. It is important to respond professionally and to accommodate if possible, public requests and input.

3.6 CONTACT WITH THE NEWS MEDIA

The Project Engineer may be required to submit project related information to the local media. Only routine information (road closure times, etc.) may be submitted directly to the media. All other inquiries must follow the policy outlined below.

The Project Engineer should establish a simple agreement with the "Owner Agency" regarding media contacts. The Project Engineer should also establish a procedure to contact the local media in case of an emergency that could endanger the traveling public.

3.6.1 FHWA Media Policy

Given the high degree of interest in transportation issues and the volume of reporters seeking information or quotes for their stories, all FHWA employees should be familiar with the FHWA's Media Policy. The official policy can be found on FHWA StaffNet.

The policy is simple -- direct any calls or emails from newspaper/magazine reporters or TV/radio news producers to the specialists in the Office of Public Affairs listed below. Unless authorized to do so by Public Affairs, the only information you should provide reporters is the phone number or email addresses of FHWA's Office of Public Affairs.

FHWA Office of Public Affairs 202-366-0660
Doug Hecox doug.hecox@dot.gov
Nancy Singer nancy.singer@dot.gov

FHWA's Public Affairs office is always the first place reporters should be directed. This policy applies to everyone, from summer interns to the Administrator himself. The media is a stakeholder of the FHWA's as much as any other part of the public, and good customer service demands we provide them a central contact point. In this way, FHWA is better able to respond to the many inquiries of the press and, by extension, the informational needs of the public.

3.6.2 Responding to the Media

When the Office of Public Affairs asks you to respond to a member of the media, observe the following 12 rules:

1. You work for FHWA, not the media.
2. A reporter's deadline is not necessarily your deadline. You do not necessarily have to respond immediately to a request for information. Make sure you are prepared before you respond to the media (or any other public group or organization).
3. Determine whether FHWA is the proper Agency for the inquiry. Often, other Federal agencies, State DOTs, local agencies, or others are the appropriate sources for responses to many inquiries.
4. Establish or confirm ground rules (e.g., on the record, on background, off the record) and the conditions (live or taped, on camera or not, etc.) before any interview starts. The Office of Public Affairs can explain these options and counsel you about the most appropriate choices.

5. Find out as much as you can about the news organization and reporter with whom you are dealing. You may find it helpful to know if the reporter has covered transportation issues before, or whether the news organization has printed or aired stories about the subject you are talking about. The Office of Public Affairs can assist you.
6. Stress two or three main points that you want to get across. Stress them at the beginning and the end of the interview, and remain on them throughout. Other information you may provide should support one or more of your main message points.
7. Provide the information (in your expertise area) for which you are asked—no less, no more. Avoid commenting on subjects in which you have little or no expertise.
8. Avoid speculation. Never answer a question that begins, "What do you think..." Go with what you know.
9. Decline answers to hypothetical questions. Never answer any question that begins, "What if..." Again, go with what you know.
10. Respond to questions and provide information as a representative of FHWA, adhering to the FHWA perspective and not offering your individual perspective or personal opinion. Never answer a question that begins, "That's the Agency's position, but what do you think about..." (See #1.)
11. Avoid questions involving legal matters. A standard response to any question on an issue or a subject that involves previous, ongoing, or pending litigation is: "This matter is (or will be) the subject of legal action; I have no comment." Refer the reporter to the Office of Public Affairs.
12. The media is not simply another "customer." The media is a means of mass communication—one of several the Agency uses in its outreach and communication efforts and activities. The media's message can either help or hinder FHWA's mission.

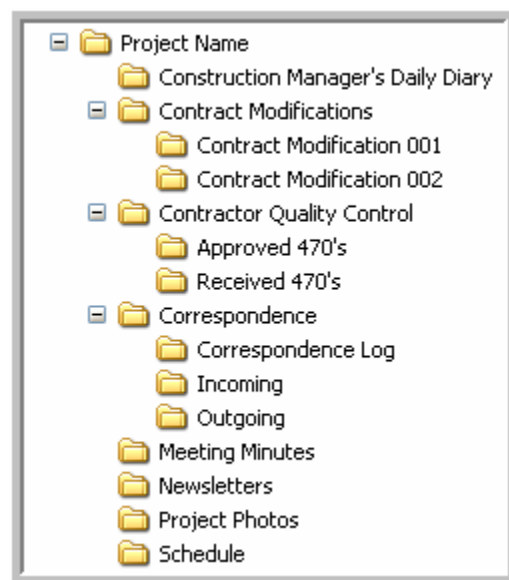
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CHAPTER 4

DOCUMENT CONTROL

4.1 COMPUTER SETUP

Use the directory set up in Exhibit 4.1A to organize files and programs, except the Engineer's Estimate program. When the Engineer's Estimate program is loaded, it will automatically be stored in a certain location. Do not try to change the file storage location for the Engineer's Estimate program, as it will prevent you from using the program.



COMPUTER DIRECTORY SET UP

Exhibit 4.1A

4.2 PROJECT FILE SETUP

Prepare binders and files with all the appropriate dividers for miscellaneous pay notes, reports, meeting minutes, sampling and testing, and correspondence, etc. for the project. Maintain and add to these files as needed throughout the project.

It is best to remove staples from any documents when filing. Staples tend to tear the documents after time and take space.

Use hanging files for the following documents:

- Contract
- Plans
- SCRs
- Geotech Report
- Environmental Assessment, Biological Assessment, other environmental documents or reports
- Design Changes

Use separate three-ring binders for the items listed below. Use tab dividers as necessary.

- Outgoing Correspondence
- Incoming Correspondence
- Contractor Daily Records (prime)
- Contractor Daily Records (subs)
- Contractor Payroll (prime)
- Contractor Payroll (subs)
- Pay Notes (With tab dividers for each pay item.)
- Estimates (with tab dividers for each receiving report, invoice, and estimate)
- Testing (The following tab dividers are just an example of what you might need to include for the testing binders.)
 - Item 20401, Proctors
 - Item 20401, Density Reports
 - Item 30101, Base Aggregate, Process Control
 - Item 30101, Maximum Density Report (Humphres)
 - Item 30101, Density Reports
 - Item 30101, Base Aggregate, CVS (Contractor Verification Sample)
 - Item 40101, "A" pile, Process Control
 - Item 40101, "B" pile, Process Control
 - Item 40101, "C" pile, Process Control
 - Item 40101, Mix Design
 - Item 40101, Hot Asphalt Concrete Pavement, CVS
 - Item 40103, Asphalt Cement grade SHRP PG 58-34, CVS
 - Item 55201, Structural Concrete, (Air, Slump, & Unit Weight)
 - Item 55201, Structural Concrete, Cylinder Breaks
 - Item 55201, Job-Mix Formula
- Surveying
 - Contractors Notes
 - Grade Change Notes
 - New Control Point List

- Reports/Plans from the Contractor
 - Quality Control Plan (Approved)
 - Accident Prevention Plan (Approved)
 - Fire prevention Plan (Approved)
 - Spill Prevention Plan (Approved)
 - Traffic Control Plan (Approved)
 - Blasting (Approved)
 - Night Lighting (Approved)
 - EEO Policy
 - Accident Reports
 - Burn Permits
 - NPDES, SWPPP Reports
 - Material Source Permits
 - Reclamation Plan
- Meetings Binder(s)
 - Preconstruction Conference agenda/minutes
 - Pre-Paving Meeting agenda/minutes
 - Pre-Pour Meeting
 - Initial Partnering Meeting
 - Weekly Partnering agenda/minutes
- Contract Modifications

4.3 CORRESPONDENCE

4.3.1 Correspondence Logs

All project correspondence binder(s) should have a correspondence log and that is be updated as documents are filed. (see Exhibit 4.3A)

Outgoing Correspondence Record		
Date Written	Serial Number	Subject
05/03/02	PUL-001	Award Letter
05/30/02	PUL-002	Preliminary Schedule Acceptance
06/05/02	PUL-003	QC Plan Rejection

EXAMPLE CORRESPONDENCE LOG

Exhibit 4.3A

4.3.2 Outgoing Correspondence

Outgoing correspondence should conform to the following general principles:

- Use the format shown in **Exhibit 4.3B**
- Serialize outgoing correspondence and address it to the Contractor's authorized representative;
- The subject should include the project name and number, contract number, and subject description;
- Confine the correspondence to one subject per document;
- Make reference to the Contractor's correspondence, or any other correspondence, by date, subject, and document number, as appropriate;
- Address all points raised in incoming correspondence in the order in which they appear (if complete answers cannot be provided, the correspondence shall provide the best information available and indicate a reasonable time when complete information will be provided);
- Use the FHWA letterhead provided on the website.

Print one copy of the correspondence and attachments. File that in the Project Files. For the WFLHD Central Files copy, e-mail the correspondence to the COE and to WFL.CentralFiles. In the subject line of the e-mail, type the project name. With this subject line, the file room clerk knows to print and file the correspondence. If there are any attachments, scan and e-mail them as well.

For projects managed by contracted Construction Managers

All outgoing correspondence to the construction contractor must be signed by the Project Manager. Use the following process for sending correspondence to the construction contractor:

1. The Construction Manager prepares **all** correspondence. The last sentence of the body of the letter should state: *“Please contact Jane Doe, Construction Manager at (xxx)xxx-xxxx if you have any questions.”*
2. The Construction Manager e-mails the correspondence to the Project Manager for review and/or revisions.
3. The Project Manager will review and revise as needed, attach electronic signature to the correspondence, and e-mail back to Construction Manager. If significant revisions are required the correspondence may be sent back to the Construction Manager for corrections and resubmission before being signed electronically.
4. The Construction Manager will print correspondence and send to the construction contractor.

4.3.3 Incoming Correspondence

Stamp incoming correspondence with the *Received by/Date* stamp.

Send the original copy of incoming correspondence to the WFLHD Central Files through the COE. This applies only to correspondence, construction schedules, the QC/QA Plan, Accident Prevention Plan, Hazardous Spill Plan, etc. For documents such as pay notes, payrolls, certifications, test reports, etc., file the original copy at the project office. Send the subcontracting forms (SF1413 and WFLHD-130) to the Contract Administration Specialist.

If multiple originals are submitted, like construction schedules, send one to central files after reviewing it and stamping it “accepted” or “not accepted,” and file one copy in the project office correspondence book. The other copy may be sent to the COE for their review and disposition. Encourage the Contractor to always send an original copy of all faxes submitted. Attach the faxed copy to the original copy when it’s received and follow the above procedures for filing.

For projects managed by contracted Construction Managers

1. All incoming correspondence should be addressed to the Construction Manager.
2. Construction Manager reviews correspondence.
3. Construction Manager scans correspondence and attaches to an e-mail along with comments and recommendations to the Project Manager.
4. Project Manager reviews and sends any suggestions or comments back to the Construction Manager for follow up.
5. The original correspondence is sent to Central Files through the COE. File a copy in the “From:” project correspondence book(s).



**U.S. Department of Transportation
Federal Highway Administration**

FHWA [project name] Project Office
[PROJECT ENGINEER'S NAME], Project Engineer
[STREET ADDRESS]
[CITY], [STATE] [ZIP]
[phone] [fax]

Date

Name, Title
Company
Address
City, State, Zip

RE: Project Number
Project Name
Contract Number

Dear Mr./Ms. _____:

Text

For projects managed by contracted Construction Managers . . .

Use the following address above:

FHWA [project name] Project Office
[CONSTRUCTION MANAGER'S NAME], Construction Manager
[STREET ADDRESS]
[CITY], [STATE] [ZIP]
[phone] [fax]

Sincerely,

Name
Project Engineer

For projects managed by contracted
Construction Managers . . .

The FHWA Project Manager will sign
correspondence using the "Project Manager" title.

cc: Central Files (thru COE)
Project Files



LETTER FORMAT

Exhibit 4.3B

4.4 REQUESTS FOR PROJECT RECORDS

Requests to inspect diaries or other records (except as covered below) should be referred to the COE and Freedom of Information (FOIA) Officer. If a contractor indicates it wants to review or have copies of project records notify the contractor that it needs to make the request in writing to the FOIA officer at the Vancouver office address. Notify the FOIA officer and COE of any such indications or requests. The FOIA officer will coordinate with the COE on providing documents for copying and/or review.

The project staff should not allow the contractor to review and/or copy any project documents (except as covered below). The Government is obligated to protect privacy type information that may be included in any project documents, so it is necessary to follow these procedures.

The exception to the above is pay notes, progress estimates, any documents submitted by the contractor (including any subcontractor or supplier documents) and any documents we sent to the contractor (including subcontractors or suppliers). The prime contractor is allowed to review these documents and the project staff is allowed to make copies of these documents for the contractor, as long as it is not more than 100 pages. Anything more than 100 pages needs to go through the FOIA process. Do not give these records to the contractor to make its own copies.

Any requests directly from a subcontractor must go through the FOIA process (even if it is to look at its daily report). There is no exception to this. A prime contractor can request to view or have copies of documents on the subcontractor's behalf, but all interactions are to be between the Government and the prime following the process outlined above. The subcontractor can view allowed documents as long as the prime contractor is present throughout the review.

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CHAPTER 5

DELIVERING THE PROJECT

5.1 CONTRACT AWARD

WFLHD will conduct responsiveness and responsibility checks of the low bidder. If all requirements are met, a WFLHD Contracting Officer will issue the contract award letter to the Contractor, which indicates the name and contact information of the COE. The award letter also requests the contractor to provide performance and payments bonds, and a certificate of insurance.

5.2 PRECONSTRUCTION CONFERENCE

5.2.1 Date

As soon as practicable after the Contract is awarded and before contractor begins work, the COE will schedule the preconstruction conference date with the Contractor.

5.2.2 Invitees

The COE will invite the Environmental Specialist and other WFLHD specialists as needed. The COE should provide two months notice to the Environmental Specialist of the likely time frame for the preconstruction conference (normally in the two week period prior to issuance of the NTP) for scheduling purposes.

The Project Engineer will invite all non-WFLHD parties. At a minimum, include the County, Forest Service, and National Park service representatives as appropriate. In addition, it may be appropriate to invite the State DOT, utility companies, and any other groups that will be significantly affected by the construction. Invitations may be via e-mail, regular mail, or telephone.

5.2.3 Agenda and Roles

There are numerous issues to discuss at the preconstruction conference. While FHWA and the contractor have interest in all the issues, others such as partner agencies, cooperating agencies, utility companies, and subcontractor are only interested in topics that affect or pertain to them. Therefore, the preconstruction conference should be divided into two parts.

At the Part 1 conference, discuss items that are of interest to the partner agencies, cooperating agencies, utility companies, subcontractors, and the prime contractor. Such items include: the plans and specifications for the project; unusual conditions; safety; environmental and permit requirements and restrictions; the Contractor's plan and schedule of operation; maintenance of traffic; and material sources and testing requirements.

The Project Engineer should prepare and send a meeting agenda to the Contractor to assist them in preparing for the meeting. See Section 5.2.5, Part I Preconstruction Conference Agenda. The agenda should be augmented to reflect unique features of the contract and project specific issues.

Either the Project Engineer or COE will begin the conference by welcoming the participants and explaining the WFLHD organization and how the Construction Contract will be administered, specifically covering channels of authority and methods of conveying instructions and orders. Emphasize that all orders to the Contractor relating to the Contract will be issued by WFLHD.

After introductions, the Project Engineer will lead the preconstruction conference, beginning with introducing the cooperating agencies and explaining their role in the project. The Project Engineer will run the remainder of the conference, but it works very well if a team approach is taken between the Project Engineer and COE. This allows the next facilitator to gather their thoughts for the next agenda item and gives the current facilitator time to capture any notes.

The Contractor's representatives should explain their organization, and designate or identify a representative who will be assigned to the project with full authority to act for the Contractor. See FAR

Clause 52.236-6, Superintendence by the Contractor. If a representative is not identified at the conference, the Contractor should be requested to submit a written designation at a later date, but before the NTP.

The remainder of the Part 1 preconstruction conference is self-explanatory.

A second preconstruction conference, attended by only the Project Engineer and Contractor, should be scheduled at a later time, but before work starts. At this meeting, the Project Engineer and contractor should discuss items that are of interest only to FHWA and the contractor (FAR clauses, contractor quality control, paynotes, invoices, equal employment opportunity requirement, submittals, etc.)

5.2.4 Notes

The Project Engineer will be the primary note recorder for the preconstruction conference, but the COE should also take notes of relevant issues. Shortly after the conference, all notes should be provided to the Project Engineer for inclusion into the official copy.

The Project Engineer should provide the official preconstruction conference agenda, with all notes and details from the meeting added, to the Contractor for their signature. The Project Engineer will also sign this copy and provide it to WFLHD central files. Provide a copy with a cover letter to the Contractor as well.

5.2.5 Preconstruction Conference Agenda – Part 1

1. Introductions.

FHWA Organization.

- A. Construction Engineer, *name*
Construction Operations Engineer, *name*
Project Engineer, *name*
Bridge Design Engineer, *name*
Environmental Protection Specialist, *name*
- B. FHWA Delegation of Authority

Contracting Officer, *name*
Construction Engineer, *name*
Construction Operations Engineer, *name*
Project Engineer (COTR), *name*
Inspector(s)
- C. Correspondence from the Contractor addressed, unless otherwise directed, to:

name
Federal Highway Administration
street address
city, state zip code

3. Cooperating Agencies.

- A. U.S. Forest Service, National Park Service, U.S. Fish and Wildlife (*pick one or modify*)
- B. *state department of transportation's name*
- C. *county*

4. Contractor's Organization.

- A. Contractor's organization and definition of each representative's authority.
- B. Correspondence from Project Engineer addressed to:

Contractor Rep's name
Mailing Address

5. Subcontracting.

- A. Subcontractors and subcontracted work
- B. Contractual relations between the government and the subcontractors. (FP-03 108.02)
 - 1. Subcontracting does not create any contractual relationship between subcontractors and the Government.
 - 2. The Contractor is responsible for the subcontractor's performance and contract compliance.
 - 3. All correspondence from the subcontractor will be routed through the Prime Contractor.

6. Labor Provisions

- A. Contract Work Hours and Safety Standards. (FAR 52.222-4)
 - 1. No Contractor or subcontractor employing laborers or mechanics shall require or permit them to work over 40 hours in any workweek unless they are paid at least 1 and ½ times the basic rate of pay for each hour worked over 40 hours.
- B. Davis-Bacon Act. (FAR 52.222-6)
 - 1. No laborer or mechanic employed directly upon the site of the work shall receive less than the prevailing wage rates and fringe benefits as determined by the Secretary of Labor. (SCR page D-1)
 - 2. Paid not less often than once a week.
 - 3. Surveyors, inspectors, and testers are not subject to Davis-Bacon wage rates.
 - 4. Material source workers are not subject to Davis-Bacon wage rates unless the source is immediately adjacent to the project site.
 - 5. The "owner/operator" classification applies only to trucks. Anyone other than the truck owner operating the truck must appear on a payroll.
- C. Payrolls
 - 1. One copy of certified payrolls from both the Prime and the subcontractors are to go to the Project Engineer within 7 days of the payment date. (FAR 52.222-8(b)(1))
 - 2. Subcontractor payrolls are to be submitted through the Prime Contractor.
 - 3. If classification codes are used, two copies are to be submitted with the first payroll.

7. Safety

- A. Fire control plan (SCR page ____)
- B. It is the Contractor's responsibility to monitor safety and identify deficiencies on the project (FAR 52.236-13, FP-03 107).
 - 1. ***Safety is the #1 priority!***
 - 2. MSHA Part 46 compliance for crushing operation.
- C. Project personnel will not inspect under unsafe conditions.

**TAILOR THE REMAINING SECTIONS TO YOUR PARTICULAR PROJECT
THE FOLLOWING IS JUST AN EXAMPLE OF WHAT WAS USED FOR A PAST PROJECT**

8. Section 103 - Scope of Work

- A. Value Engineering Proposals (FAR 52.248-3)
 - 1. Is the contractor considering any VE proposals?
 - a. _____
 - b. _____

9. Section 104 - Control of Work

- A. Shop Drawings
- B. As-Built Drawings
- C. Load Restrictions--Comply with all legal load restrictions when hauling material and equipment on public roads to and from the project. A special permit does not relieve the contractor of liability for damage resulting from the moving of material or equipment. (FP-03 104.05)

10. Section 105 - Control of Material

- A. Contract does not include any Government-provided sources
- B. Contractor-located sources
 - 1. Locations & types of material (301, 401, 251, etc.)
 - 2. Haul routes
- C. Storage and Staging Areas
 - 1. Government provided
 - A. _____
 - B. _____
 - 2. Possible contractor located
 - A. _____
 - B. _____

11. Section 107.—Legal Relations and Responsibility to the Public

- A. Utilities
 - 1. Utilities have been relocated or adjusted. (SCR 107.02)
 - 2. Coordination of activities to transfer utility lines to new bridge. *
 - 3. Spacing for utility hangers is 3 meters (10 feet).
 - 4. Names and telephone numbers for emergency contacts in case of damage.
- B. Cooperation and coordination of work with other construction projects in the area.
- C. Protect existing structures, utilities, work, and vegetation (FAR 52.236-9, FP-03 107.02)
 - 1. The Contractor shall preserve and protect all structures, equipment, and vegetation on or adjacent to the work site, which are not to be removed and which do not unreasonable interfere with the work required under this contract. **Do not disturb the area beyond the construction limits.**
- D. Storm Water Pollution Prevention Plan inspections and modifications to the plan.
- E. Environmental protection requirements. (FP-03 and SCR 107.10)
 - 1. Clearances for material sources, disposal sites, waste areas, haul roads, and staging areas outside of the project limits.
 - a. Time frame for documentation for ESA, SHPO, and Wetland clearances.
 - b. Tentative date when the source approval is Needed:_____
 - 2. In-stream work window July 15 to October 15.
 - 3. Submit a Hazardous Spill Plan, prior to construction.
 - 4. All equipment, materials, and vehicles to be used at the project site shall be cleaned and certified free of noxious weeds prior to entrance onto the project site.
 - 5. Discovery and requirements for notice.

- F. Process for informing workers of environmentally sensitive areas.
 - G. Ramifications of non-compliance of permit requirements for FHWA and the Contractor.
- 12. Section 108.— Prosecution and Progress**
- A. Winter shutdown date _____
 - B. Station 10+00 – 12+00, no work between 4 pm and 6 am
- 13. Section 152.—Construction Survey and Staking**
- A. Survey control.
 - 1. The Government has set the initial horizontal and vertical control points. (SCR 152.02)
 - 2. Review survey control set by the government. (Reference line, control points, pertinent data)
 - 3. Contractor is responsible for line, grade, preservation of control points, etc.
 - B. Start work only after staking for affected work is accepted (FP-03 152.02)
 - C. Furnish all survey notes at least weekly. (SCR 152.02)
 - D. Compute and furnish calculations supporting pay quantities. (SCR 152.02)
- 14. Section 155.—Schedules for Construction Contracts**
- A. Notice to proceed date and completion date. (FAR 52.211-10)
 - 1. Notice to Proceed Date, December 10, 2003
 - 2. Fixed Completion Date, August 30, 2005
 - B. Work shift time and days. Furnish notification at least 14 days in advance of any change to the work shift schedule.
 - C. Preliminary work plan – Contractor presents to group
- 15. Section 203.—Removal of Structures and Obstructions**
- A. Coordinate delivery of bridge stringers and asphalt disposal with Ravalli County Road Dept.
 - B. Disposal plan for removing bridge material.
- 16. Section 204.—Excavation and Embankment**
- A. Disposal site for unsuitable or excess material.
- 17. Section 551.—Driven Piles**
- A. Equipment and wave equation submittal at least 30 days before pile driving begins.

Final Comments

SIGN THIS AFTER YOU HAVE INCLUDED ALL OF THE NOTES TAKEN AT THE PRECON.
DO NOT SIGN AT THE PRECON

CERTIFICATION: The preceding items have been discussed.

Signature for the Contractor: _____.

Signature for the Government: _____.

5.3 NOTICE TO PROCEED

5.3.1 Issuing the Notice to Proceed

The COE will issue the Notice to Proceed (NTP).

The NTP can be issued once Legal Counsel and Contracts have reviewed and approved the contractor's bonds and insurance. If the contractor has fulfilled these two obligations, but has not met other requirements of the contract such as construction schedules, subcontracting, Quality Control Plan, etc., the Notice to Proceed still should be issued. However, in accordance with the terms of the contract, the contractor may be prevented from commencing work at the project site(s) until the other contract requirements are met.

FAR Clause 52.211-10, Commencement, Prosecution, and Completion of Work, provides a specific number of calendar days (i.e., after the bid opening or receipt of acceptable bonds) or a specific date, by which time the Notice to Proceed must be issued. In the event the NTP is not issued within the specified time period, for reasons not the fault of the contractor, the Government is obligated to extend the fixed completion date accordingly. This revision should be incorporated into the contract via a bilateral contract modification.

Inordinate delays in issuing the NTP may warrant more than just a day-for-day extension if the project completion date has been pushed into a season with less favorable working conditions. In addition, the Contractor may be due compensation for additional costs such as remobilization for the extra season. Such costs should be addressed in a contract modification.

5.3.2 Selecting the Actual Notice to Proceed Date

FAR Clause 52.211-10, Commencement, Prosecution, and Completion of Work, requires the contractor to commence work within a specified period of time after receipt of the NTP. To allow the Contractor to coordinate operations and mobilization, the date for issuing the NTP should be discussed with the Contractor. However, it is important that the Project Engineer and COE remain aware of the status of project award and establish a NTP date that falls within the time period specified in the contract. If WFLHD and the contractor mutually agree to delay the NTP date, a bilateral contract modification should be executed.

5.3.3 Progress Payments Before the Notice to Proceed

On occasion, the Contractor will perform preliminary work before the NTP is issued. This may include developing their construction schedule, preparing shop drawings, and ordering materials.

Unless the contract specifically requires the work to be performed before the NTP, the government should not make a progress payment for the work. However, reimbursement for bond premiums may be paid as provided in FAR Clause 52.232-5, part (a). Payment for preparation of construction schedules before the preconstruction conference may also be payable under the normal procedures for progress payments.

If the contractor elects to perform other work before the NTP date, and the contract does not require that the work be performed before the NTP, the contractor must wait until the NTP has been issued before submitting an invoice for that work.

5.4 PARTNERING

5.4.1 Background

Contractors will be invited to participate in a partnering program to establish good communications and a good working relationship between WFLHD, the Contractor, and the cooperating agencies. WFLHD's goal of partnering is to enhance communication, improve efficiency, promote creativity and problem solving, and reduce construction claims. The Project Engineer, COE, and all WFLHD personnel involved in the project are expected to support this intent in dealing with the Contractor.

While the Contract establishes the legal relationships, the partnering process attempts to establish working relationships among the parties (stakeholders) through a mutually developed, formal strategy of commitment and communication. It attempts to create an environment where trust, continuous communication, and teamwork prevent disputes, foster a cooperative bond to everyone's benefit, and facilitate the completion of a successful project.

Making changes to the Contract requirements or relaxation of the specifications are not a part of the partnering process. However, when changes are appropriate to solve a problem or make the project run smoother, partnering is the forum that the stakeholders can use to recognize the need for the change and to quickly reach an equitable agreement.

5.4.2 Decision To Partner

As part of the notice to bidders, an invitation to partner is included in the Contract. Prior to the preconstruction conference, the COE will determine from the Contractor if the project will be partnered. Jointly, they will agree upon the level of the partnering effort, the location and tentative date of the workshop, and most importantly, who should participate.

5.4.3 Partnering Facilitator

Next, the COE and the contractor will determine who will facilitate the workshop. Generally, if the Contractor has a preference, WFLHD will honor that selection. If prior arrangements and commitments are made, consideration should be given to have the partnering workshop in conjunction (before or after) with the preconstruction conference.

The success of most partnering efforts often rests with the facilitator; therefore, the selection process is most important. If a nominated facilitator (or firm offering such services) is not well known, a qualification review should be done by the COE, particularly through telephone contact with references, other clients, and State agencies. Since the cost of their services will often range from \$1,000 to \$2,000 per day, the need to evaluate the facilitator's capabilities and credentials is essential.

The partnering facilitator should bill the Contractor directly. WFLHD will pay for half the cost as provided in Subsection 103.05 of the Contract. The Contractor should provide the invoice to the Project Engineer, and payment will be in the next monthly progress payment. The item should be added as a line item payment, similar to incentives for quality materials.

5.4.4 Attendance List

Following selection of the facilitator, the Project Engineer or COE should finalize the attendance list with the Contractor. The availability and role of key decision makers in the management of the Contract is very important. Ideally, both WFLHD and the Contractor should strive to have their respective key persons attend all formal partnering workshops.

A successful match-up for a partnering workshop could include:

For the Contractor	For WFLHD
Senior Vice-President	Division Engineer/CO
Branch Manager	Construction Engineer
Project Manager	COE
Project Superintendent	Project Engineer
Foreman	Project Inspectors

Other representation may include the clients or customers, the State or county maintaining agencies, regulatory or compliance groups and others that may impact the project during construction.

When deciding on the appropriate attendees, do not unnecessarily expand the size of the group to the extent that the partnering process may fail. Keep in mind the success of the partnering workshop depends on the expertise and actions of the facilitator and, most important, the cooperation and commitment of the key decision makers.

5.4.5 Length of Partnering Session

Another critical question in scheduling a formal partnering workshop is: "How long should the session last?" Since key individuals must allot their time carefully due to their respective positions and responsibilities, it is suggested that one-half day to two days is ideal for the typical large or complex WFLHD contract. Of course, if all parties agree, additional time should be scheduled. Often the selected facilitator can provide input here. But, follow the rule: Don't make the partnering workshop too long; it will deter from the intended goals and expectations.

5.4.6 Location

The Project Engineer will locate and secure facilities for the partnering meeting, then proceed to contact the identified individual participants by telephone and personally invite them to the workshop, identify the facilitator, and present an overview of the partnering concept. At this time, the date and location of the workshop should be confirmed. Often the facilitator will wish to call each of the participants to outline the partnering process and establish common goals.

5.4.7 After The Initial Partnering Session

Beyond the workshop, it will be necessary to agree on the approximate frequency of subsequent meetings of the stakeholders, and if those meetings will be facilitated. Generally, facilitated meetings are more formal and less frequent – say quarterly – than non-facilitated meetings. However, if serious conflicts develop, facilitated meetings may be more effective than non-facilitated.

5.5 MEETINGS

The Project Engineer must attend all project-related meetings, and is expected to facilitate and conduct meetings set up on the Government's behalf. The Project Engineer will take a proactive, collaborative approach in facilitating and conducting the meeting to ensure good project-level lines of communication. The Project Engineer will prepare and circulate the agenda if required as well as all meeting minutes. Some of these meetings are but not limited to preconstruction conference, mid-construction reviews, partnering both initial and weekly, and facilitate project visitors from the WFLHD, client agencies, resource agencies, or any other project stakeholder.

5.5.1 Weekly Job Progress Meetings

Regular job progress meetings, sometimes referred to as partnering meetings, between the various parties to the project, probably cover more issues and contribute more to the exchange of information necessary to complete the work than all the correspondence on the project. What occurs at such meetings is therefore of great importance and should be documented well.

At the Preconstruction Conference or initial partnering session, the Project Engineer and Contractor will establish a day and time for weekly job progress meetings. The purpose of these meetings is to discuss any ongoing issues, coordinate submittals, and to look ahead and prepare for the upcoming work.

At a minimum, the Contractor's project superintendent, quality control manager, and project manager should attend. The Contractor is encouraged to invite subcontractors, as appropriate.

Minutes of the meeting shall be recorded by the Contractor or Project Engineer, and distributed to all parties by the next business day.

5.5.2 Meeting Minutes

Use the following guidelines for conducting and documenting all meetings.

At the opening of each regular meeting, the notes from the previous meeting can be reviewed to confirm their accuracy and the mutual understanding of the participants. By identifying those items that remain outstanding, the previous meeting's notes can serve as an agenda for the current meeting.

The name, title, and affiliation of each participant should be listed. A sign-in sheet can be passed around at the start of each meeting. In the minutes, note any absentees or visitors.

Record the subjects covered, the nature of the discussion, the future actions to be taken and by whom. The notes should be concise but informative. The items discussed could be indexed or designated in a manner that they can be located for future reference.

Minutes should then be prepared and copies distributed to all participants and those affected. Objections or exceptions taken by any of the parties involved should be documented in the minutes. The objective of the meeting minutes is to provide a complete and accurate record of agenda and a summary of substantial discussions. Any party taking exception or objecting to any aspect of the content of the meeting minutes must be required to do so in writing by a certain time after each meeting.

5.6 PROJECT NEWSLETTER

The Project Engineer should prepare and distribute weekly newsletters of project activities. The newsletter provides a weekly forecast of upcoming construction operations to keep management, the cooperating agency(s), and the public well informed of project issues.

5.6.1 Newsletter Guidelines

- Obtain buy in from the COE on the format of the newsletter.
- Distribute to agency contact(s), landowners, cross functional team, your COE, the general public and other avenues as appropriate.
- **Do not send to the media.**
- Use lay (general) terms, not engineering terms.
- Keep to one page if possible.
- Provide project identification and date of the report.
- Include project phone number; fax number and mailing address in every newsletter.
- Provide the schedule for the upcoming week and the possibly the week after that.
- Suggest distributing on Fridays so people can plan their next week, but use what date works best for the project.
- Highlight traffic and safety restrictions, such as road closures.
- Unless instructed otherwise by your COE, only prepare newsletters during active construction.
- Send via fax, e-mail or in person when possible to keep the information timely.

5.6.2 Example Newsletter

WY PRA-YELL 12(5) Northeast Entrance Road MT PFH 59-1(2) Beartooth Highway



Construction Activities and Upcoming Work

The Woody Creek Staging Area (by the dump) is closed to public dumping. The new wood dump is at the old USFS dump on the south side of the highway near the Lulu Pass Road. Signs are installed to direct where dumping of wood is allowed.

Clearing is complete on the project except for the Church Parcel. Grubbing of the stumps and removal of the topsoil will begin in the spring.

What is that green stuff? (Now white with snow) Temporary soil stabilization has been applied to all disturbed soil. It is a mixture of soil “glue”, water and seed. The seed is slender wheatgrass and common barley. The green stuff is a tracer to indicate coverage. The glue is Atlas SoilLok.
http://www.quattroenvironmental.com/QEI_Atlas.html. There is an MSDS listing on the webpage.

Waterline work is finished for the year. The majority of the work in Cooke City was completed. About a week’s worth of work will be necessary in May or early June in Cooke City for the installation of fire

hydrants. Waterline work will be completed next year on the south side of the highway just west of Cooke City once the work in town is complete. The waterline work is expected to be complete by mid June.

Pipe culvert installation will resume in May.



Driving Conditions

For up to date road closures and travel information on the Beartooth Highway call 1-888-285 INFO (4636). This hotline is updated on a weekly basis during the construction season.

The road is currently open to public traffic. See below for traffic delays. The paved road surface will remain in place until the 2008 construction season. A couple of gravel patches where pipe culverts and water line was installed will remain over the winter.



Traffic Delays

There are no traffic delays during the winter shutdown. Please use caution in the construction zone and be aware of snow removal equipment working throughout the project. Minor delays for snow removal and maintenance may resume in April. During the construction season, expect delays up to 30 minutes. No delays will occur on the weekends or holidays.



Road Closures

No road closures are scheduled for this project. US 212 **east** of Cooke City is currently closed and will be plowed and opened for traffic the first of May.



Alternate Routes

No alternate routes are available. All traffic entering or leaving the Northeast Entrance of Yellowstone National Park will travel through the construction project.

CONTACT INFORMATION

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Information 1-888-285-INFO (4636)
[CFLHD Beartooth Updates](#)

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5.7 WORKING DRAWINGS

See FAR Clause 52.236-21 - Specifications and Drawings for Construction and Subsection 104.03 of the FP.

The Contract states the time requirements for submission and approval of working drawings.

The Project Engineer should review the Contractor's schedule for submissions so that the Government can schedule its own resources. The Contractor should also be advised to promptly submit information on suppliers and subcontractors whose work will require Government inspection and testing, particularly offsite inspection.

5.7.1 Review and Approval Responsibility

5.7.1.1 Drawings Required Under FP Subsection 104.03(a)(1)

Some of the items required under Subsection 104.03(a)(1) can be reviewed by the project office with no input from either Bridge or Geotech; however, project personnel are always welcome to send in anything they either do not feel comfortable reviewing themselves, or that they want a second set of eyes to check. Project personnel are encouraged to review the submittals before they send them in. If there are obvious errors, or the submittal is not complete, save everyone time and send it directly back to the contractor without first sending it to Vancouver. This, of course, is a judgment call.

Generally speaking, layout drawings for walls and detours are best reviewed in the field. These drawing cannot be verified from Vancouver. Likewise, work plans like gabion andrevet mattress installation are best reviewed in the field.

Any concrete forms should be sent to Bridge. For relatively short structures (i.e. under 1800 mm in height), the project office may review and approve the design. These tend to be over designed by their very nature. As always, if in doubt, send them in to Vancouver.

Fabrication drawings for precast prestressed concrete members should be sent to Bridge. (Precast box culverts can be reviewed in the field if the design matches what is shown in AASHTO. If in doubt, send them to Bridge.) Structural steel fabrication drawings should be sent to Bridge. Minor steel assemblies such as bridge rails, guard angles, expansion joint assemblies, and utility hangers can be reviewed and approved in the field.

5.7.1.2 Drawings Required Under FP Subsection 104.03(a)(2)

In this group, drawings pertaining to concrete forming, bridge construction, and rigid walls (cast-in-place concrete, soldier pile or tie-back) go to the Bridge Engineer. These will include (steel girder) erection plans, detour bridges, concrete forms, shoring and cofferdams, post-tensioning systems, and tie-back walls.

Flexible walls and slope reinforcement goes to Geotech. These include reinforced slopes, MSE and crib walls, and gabion walls.

Ground anchors and rock bolts are a collaborative effort between Geotech and Bridge, and Bridge will take the lead on getting Geotech input.

5.7.1.3 Drawings Required Under FP Subsection 104.03(a)(3)

All items in required in Subsection 104.03(a)(3) (i.e. falsework) should be sent to Bridge.

5.7.1.4 Miscellaneous Submittals

Concrete mix designs can generally be reviewed and approved in the field. If there is some question, or the Project Engineer desires some guidance, send a copy to Bridge. When Subsection 551.03(b) calls for approval of the pile driving equipment to be based on a wave equation analysis, send this to Geotech for review and approval. Blasting plans should be sent to Geotech for review and approval.

A few other construction items require the contractor to submit experience qualifications. These include drilled shafts and tie-back anchors. Send these to Geotech for review.

5.7.2 Drawing Distribution Process

Follow the steps below for submittal and working drawing approval.

1. Establish a system for scheduling and tracking submittals or working drawings. Consult the COE for input and direction when setting up this system. The system should identify which of the cross-functional team members (approving official) the particular submittal should be sent to.
2. Once the contractor submits the specified number of prints, drawings or submittals to the Project Engineer, the Project Engineer promptly forwards all but one set of prints, drawings or submittals to the appropriate cross-functional team member for review, unless approval can be done by the COE. If the COE can approve, send all but one to the COE.
3. The Project Engineer also reviews the drawings and provides the approving official with pertinent comments. The approving official reviews and marks each sheet with the notation "**Approved,**" "**Approved as Noted,**" or "**Returned for Correction,**" as appropriate.
4. Upon approval of the print, drawing or submittal the approving official will return them to the Project Engineer for distribution as follows:
 - A. **If required,** one set to the Quality Assurance Engineer who will arrange for inspection by an outside agency.
 - B. One set to the contractor
 - C. One set to the COE
 - D. One set to Central Files through the COE
 - E. One set to project files
 - F. One set any appropriate inspectors

Make additional copies as needed.

5.8 AS-BUILT WORKING DRAWINGS

As-built working drawings are required on all WFLHD projects (FP Section 104). The contractor is required to complete the as-built drawings on full-sized project plans if supplied. If not supplied, normal-sized plans are acceptable.

At the completion of the project, the marked plans should be sent in with the rest of the project records.

The items listed below are to be covered as well as any other items specified in the SCRs.

5.8.1 Plans

- **Alignment** - All revised alignment should be shown. Where bearings, curve data, etc., do not change, the data should be checked for accuracy.
- **Changes** - Changes in construction limits, if any, should be shown.
- **Bridges** - Stations of all bridge ends should be shown.
- **Ties** - Ties to any additional found corners should be shown.
- **Approach Roads** - The constructed location of all road approaches are to be shown.
- **Right-of-Way** - All right-of-way adjacent to private property is to be shown with care for correctness.
- **Monuments** - All monuments should be shown.
- **Utilities** - All utilities should be shown (e.g., gas, water, commercial power, sewers, etc.), including new, existing, abandoned, and removed facilities.
- **Underdrains** - Location, size, and depth of underdrains should be shown.
- **Channel Changes** - As-constructed channel changes should be shown.
- **Crossings** - Elevations for all aerial and underground crossings of utilities should be shown. (One should not attempt to measure directly from the road to the sag in overhead crossings.)

5.8.2 Profile

- **Grades** - Corrected grades and grade points of intersection (P.I.s) should be shown.
- **Equations** - All equations and stationing should be shown.
- **Culverts** - Correct culvert lengths, type, invert elevations, and stations are to be shown. Skew angles and as-built grades should be shown.
- **Extensions** - On culvert extensions, the length of existing pipe, as well as extension, should be shown.

5.8.3 Permanent Bench Marks

- **Monuments** - Data on monuments should be shown.
- **Datum** - Datum used for levels should be shown.

5.8.4 Retaining Walls

- Limits and type of wall are to be shown on profile sheets.

5.8.5 Guardrail

- Corrected stationing, lengths, and offsets from edge of pavement or travel lane, if different than original plans, should be shown.

5.8.6 Fencing

- Construction limits of fencing in relation to centerline should be shown.

5.8.7 Typical Sections

- Any revisions in both dimensions and materials should be shown. Also, stations, if termini were revised, should be shown.

5.8.8 Bridges

- Any changes in bridge plans should be shown. If built without changes, it should be indicated on the plans that no changes were made.
- Information required for bridges includes the following:
 - **Subsurface Log** - A log of foundation material encountered if substantially different than information shown on plans. Log sheets should be attached to plans if necessary or convenient.
 - **Pile Driving Records** - Pile driving records including size, length, type, bearing, and tip elevation should be included. Record sheets should be attached to plans if necessary or convenient.
 - **Elevations** - Footing and seal elevations, if different than plan, should be included.
 - **Changes** - Any changes in plan or dimensions should be noted, including any major changes in reinforcing.

5.9 LOAD LIMITS

Subsection 104.05 of the FP requires the Contractor to comply with load limits on public roads in the vicinity of the project. As a practical matter, this is difficult to enforce except where materials are being delivered by the ton with weigh tickets. The Project Engineer should, however, be particularly sensitive to this problem when there are complaints from local officials, and during periods of wet/thawing subgrade. The project office staff should cooperate with these officials in their reasonable attempts to protect their roads, even when our contractor may be inconvenienced.

In terms of WFLHD's contract liability, it is preferable to have a legal order from the local official, or a strongly worded demand stating "hauling be temporarily discontinued or loads restricted" than for Project Engineer to take actions based on verbal or other poorly documented requests. Actions, which may be perceived as unilateral on the part of WFLHD, could be considered a change, and subject the Government to liability for the Contractor's increased costs. The Project Engineer should contact the COE for advice when in doubt.

On the project itself, overloads are not normally a problem through construction of the untreated base layers of the pavement structure. However, once construction of asphalt concrete or treated layers begins, they must be protected from damage.

Although the Contractor is required to repair damage caused by overloads, there may be times when it is appropriate to prohibit heavy loads (even loads less than the legal maximum) in certain circumstances when the probability of damage is present. Again, the COE should be solicited for advice.

5.10 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE

The Contractor is responsible for the protection of all public and private properties adjacent to the construction insofar as they are endangered by the construction operations. This responsibility also extends to designated materials sources and property adjacent to haul roads. If the Contractor fails to take proper precautions or persists in performing the work in a manner, which causes damage to such property, the matter should be called to its attention in writing. The Contractor is obligated to repair, rebuild, or otherwise restore such damaged property, or make good such damage or injury.

Occasionally there are claims against the Contractor related to damage to its own (non-designated) materials sources or to property not directly related to the Contract. WFLHD or the Construction Management firm should try not to become involved in such disputes. However, there are times when, for political or public relations reasons, our involvement is necessary. There are also certain environmental protection laws, which make the Government partially responsible even for private sites, which are related to the construction project. The Project Engineer should discuss such cases with the COE prior to taking action.

Since landscape degradation often cannot be completely restored, emphasis should be placed on prevention of damage. In cases of damage, the Project Engineer should contact the appropriate representative of the agency concerned and discuss the extent of repairs that the Contractor must make. Request a written description of the repairs so that the Contractor may be given a copy. As long as the requested repairs are reasonable, the Contractor should be given a written directive to complete them at no cost to the Government. If the requested repairs seem unreasonable or excessive, discuss the situation with the COE. If WFLHD orders corrective action under the Contract, which is later deemed excessive, we may ultimately be liable for the excess costs.

5.10.1 Trespassing

WFLHD should do no staking on private property without written permission from the owner. If the Contractor performs any construction operations outside the limits of the acquired right-of-way, or permits employees to trespass on private property, the Project Engineer should notify the Contractor of its liability for damages to such property. If for any reason additional easements or right-of-way should be necessary, the Project Engineer should notify the Project COE well in advance of the time when access will be required and secure proper written permission for right of entry.

5.11 UTILITIES

Utility relocation and adjustments are to be made by the utility company unless otherwise provided in the Contract. The specifications usually provide that the Government is responsible for coordinating with the utility and endeavoring to have all necessary adjustments made as soon as practicable, and that no additional compensation will be allowed the Contractor for any delays, inconvenience, or damage sustained due to any interference from the utility appurtenances or the operation of moving them. However, if such delays are unforeseeable, and beyond the control of the Contractor, an adjustment in contract time may be justified. Also, if the utility fails to assume their responsibility for the adjustments in a reasonably expeditious manner, the Contractor may be entitled to a price adjustment in accordance with the Changes clause.

The specifications also usually provide that the Contractor shall not start work in areas where damage to utilities might result in considerable expenses, loss, or inconvenience, until after all arrangements necessary for the protection of the utilities have been made. The Contractor also must cooperate with the utility owners in their removal and rearrangement operations.

5.11.1 Government-Owned Utilities

Special procedures for removal and/or reconstruction of Government-owned telephone lines and other utilities have been agreed upon between WFLHD and some of the Regions of the Forest Service, but such procedures usually vary in minor details in the different Forest Regions. In general, all repair, reconstruction, and other telephone work should be handled by the Forest Supervisor or authorized representative. Park Service utility lines should be handled in a similar manner.

5.11.2 Privately-Owned Utilities

In most cases, the work by utility companies must precede work by the Contractor in the affected area. The Project Engineer should request the Contractor to verify that such work has been arranged. When possible, the Project Engineer should make diary entries to document the operations of the utility companies as the work of adjustment or relocation progresses. Such data as the date of beginning of the work, the number of personnel working each day, the equipment and materials used, disposal of any salvaged material, and the date of completion of the work are particularly important.

When it is necessary to change the planned relocation from that shown on the plans accompanying the utility agreement, or when a significant increase in the estimated relocation costs is apparent, the COE must be immediately notified so that arrangements can be made for financing and modification of the agreement. When utility adjustment is delayed, and the Contractor proceeds to work in the affected area or is hindered by such delay, the Project Engineer must keep adequate records in the project diary, and support them with appropriate photographs whenever practical. This information is of value in the event the Contractor files a claim.

The Project Engineer may deal directly with the State or County right-of-way officials, and with public utilities on matters arising during construction, and keep the COE informed of all actions taken. Keep the COE informed of any information furnished, services performed, changes or problems. The COE will provide additional assistance and instructions when needed.

When field conditions require significant changes from plans or agreements, the Project Engineer will arrange for a meeting with representatives from the utility company to reach a final decision on the change. Agreement modifications will be processed, funded, and approved by WFLHD staff, based on data and estimates obtained at the above-described joint meeting.

5.12 BULLETIN BOARD

Subsection 107.03 of the FP requires the Contractor to maintain a weatherproof bulletin board, accessible to all employees at the site. The following items are contractually required to be posted on the bulletin board. WFLHD furnishes Items 1, 2, and 3 upon award of the contract.

1. Davis-Bacon wage decision - Remove pages from Contract booklet
1. EEO Poster
2. Beck Poster
3. Contractor's EEO policy

The following items may not be contractually required but may be required by regulation. WFLHD should furnish Items 1, and 2. WFLHD may furnish Item 3, if such resources are maintained by the cooperating agency, e.g. inside certain large National Parks.

1. Notice to Employees working on Federally Financed Construction Projects, Form WH 1321 - To be displayed with Davis-Bacon rates.
2. Job Safety and Health Protection poster.
3. Telephone numbers of physicians, hospitals or ambulances.
4. Blasting signals, if applicable.
5. Crane hoisting signals, if applicable.

5.13 CONTRACTOR'S RESPONSIBILITY FOR WORK

The contract provides that the Contractor is not responsible for damages due to cataclysmic phenomena of nature, acts of the public enemy, or acts of Government authorities. The Contractor is responsible for other kinds of damage to the work, even damages which are not the result of the fault or negligence of the Contractor. See FAR Clause 52.236-7, Permits and Responsibilities.

When damages occur, and the responsibility for those damages is in doubt, the Project Engineer should discuss the issues with the COE; and if immediate action is necessary, direct the Contractor to take necessary steps to repair the work. If a contract modification and compensation is in order, the contract modification should be processed through normal channels. The Project Engineer will keep exact accounts of work performed, so that payment can be made on an actual cost basis if necessary.

The payment to be made to the Contractor under the foregoing conditions should be full reimbursement for restoring the work to the condition at the time of the damage, less any salvage value of removed material.

5.14 OPENING SECTIONS OF THE PROJECT TO TRAFFIC

There are two contractual situations where the Contractor may be required to open a partially completed portion of the project to public traffic.

If the opening is a part of an overall stage construction scheme, which is a part of the Contract requirements, no special written order or directive is required. However, it may be prudent to go over the incomplete work involved and agree with the Contractor on the work remaining, and the Contractor's plan to protect and maintain the completed work. Generally the Contractor is responsible for such maintenance including vandalism and private vehicular accidents.

If the opening is unplanned, i.e. not a requirement of the Contract, the Government has a right under the Contract (FAR Clause 52.236-11) to order an opening, but may incur some liability for doing so. This situation should be discussed with the COE. The liability may include, but not be limited to increased construction costs to complete under traffic, and increased maintenance and possible vandalism costs. If the Government decides to open in spite of this liability, a written direction signed by a Contracting Officer is required.

In neither of these two cases is the Government accepting the partially complete work and the Contractor should be clearly advised of that and its continuing responsibility for completion and maintenance as appropriate.

5.15 RIGHT-OF-WAY

5.15.1 Encroachments On Highway Right-Of-Way

Where the right-of-way lies through privately owned land, the Project Engineer may become aware of the encroachment of buildings, fences, fixtures, or advertising signs on the right-of-way. The Project Engineer must ascertain from the plans or from the right-of-way agreement, whether the removal of such items is to be by the owner or the Contractor, and if by the Contractor, whether any salvage right has been retained by the owner or the Government. Any new encroachments, after construction has begun, must be reported to the COE, who will follow up with instructions on the proper course of action.

5.16 PROTECTION OF FORESTS, PARKS, AND PUBLIC LANDS

The specifications usually provide that when working within or adjacent to State or National Forests, Parks, or other public lands, the Contractor shall comply with all regulations of the authority having jurisdiction over such lands.

The governing rule concerning sanitary facilities on Public Lands specifically requires the Contractor to obtain permits for latrine construction from the public agency having jurisdiction. It has been found that some district officers of public agencies do not allow open pit toilets (chemical toilets, minimum), while others do. This matter should be cleared before the start of construction, preferably at the preconstruction conference.

5.17 CONTRACTOR PAYROLLS

The Contractor is required to submit one copy of Contractor and Subcontractor certified payrolls to the Project Engineer. The Project Engineer shall maintain the payrolls in the project files. When the project is complete, the PROJECT ENGINEER shall send the payrolls to the PM. The preconstruction conference should include an overview of the labor and payroll reporting requirements, and the minutes should reflect that these items were covered.

The Project Engineer should monitor Contractor payrolls for prompt submission and proper certification. If the Contractor does not make timely submission of certified payrolls, the Project Engineer may, after written notice, withhold progress payments until compliance is secured. In the case of subcontractor non-submission, the withholding of only the subcontractor's portion of the work may be appropriate. These actions should be discussed with the COE if they are deemed necessary.

A minimum of 10% of the payrolls should be spot checked for classifications and wage rates. The Project Engineer should use Exhibit 5.21A, Contractor Payroll Checklist or a similar form. Checks should verify that all covered personnel, including owner operators are included on a certified payroll. This includes all personnel who operate equipment or perform labor in the construction of the project. It does not include supplier employees working at a commercial plant or delivering materials. Nor does it include salaried professional services personnel, such as surveyors and materials testers unless their jobs are specifically included in the Contract Davis-Bacon wage decision.

When checking certified payrolls refer to the Davis-Bacon Wage Rates included in the contract for the base rate of pay and fringe amount. Fringe benefits may be paid to an approved fund, plan or program or cash to the employee or a combination of both. If the fringes are paid in cash to the worker the hourly fringe amount is applied to the first 40 hours of pay. If the fringe benefits are paid to an approved fund, plan or program, the amount should be equal to or greater than the hourly fringe rate times the number of hours (up to 40) worked.

For overtime, the contractor's workers are to be paid at least 1 and ½ times the basic rate of pay for each hour worked over 40 hours in any workweek. (See FAR 52.222-4, Contract Work Hours and Safety Standards Act –Overtime Compensation) The fringe benefit amount is not included in the overtime calculation.

When discrepancies are encountered during the review process, or if there are complaints from the contractor's workers, the Project Engineer should conduct and record a sufficient number of interviews with laborers and mechanics on Standard Form 1445, Labor Standards Interview, to insure that Contractor employees working at the job site are being paid in accordance with labor provisions of the contract.

Some items that may indicate falsification of payrolls include:

- An excessively high number of laborers to operators,
- Too few or irregular hours,
- Discrepancies in wage computations,
- Extraordinary deductions,
- Inconsistency with the contractor's daily record of operations.

If some of these indicators are encountered the Project Engineer should investigate further.

Project No:	Payroll No:	
Contractor:	Week ending:	
Check one: <input type="checkbox"/> Prime Contractor <input type="checkbox"/> Subcontractor	Date Received:	
PAYROLL	YES	NO
Project No., location, etc. shown		
Period covers entire week		
Employee name, address, and social security number shown		
Employee classification correct for work performed		
Wage rates in accordance with general wage schedule		
Hours worked in reasonably close conformity with project records		
Net pay calculations correct (Spot check as necessary)		
STATEMENT OF COMPLIANCE		
Project No., location, etc. shown		
Deductions statement		
Fringe benefits statement		
Signed, title shown		
Remarks and/or Deficiencies:		
Checked by:	Date:	
Project Manager:	Date:	

CONTRACTOR PAYROLL CHECKLIST

Exhibit 5.17A

5.18 EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS

The Contractor's Equal Employment Opportunity (EEO) responsibilities are specifically outlined in the following FAR Provision and Clauses:

- FAR Provision 52.222-23, Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity for Construction
- FAR Clause 52.222-26, Equal Opportunity
- FAR Clause 52.222-27, Affirmative Action Compliance Requirements for Construction
- FAR Clause 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans
- FAR Clause 52.222-36, Affirmative Action For Workers with Disabilities
- FAR Clause 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans

5.18.1 Nondiscrimination

Federal law prohibits discrimination on the basis of race, color, religion, sex or national origin. The Department of Labor (DOL), Office of Federal Contract Compliance Programs (OFCCP), is responsible for enforcement and the imposition of civil sanctions (termination, debarment, etc.). OFCCP may also refer serious violation to the Justice Department for criminal prosecution.

WFLHD employees, as representatives of the contracting agency, have no formal authority to monitor nondiscrimination or to impose sanctions for apparent violations. However, project personnel should be alert to indications of such violations and will report them through contractual channels for possible referral to the OFCCP.

At preconstruction conferences, the Project Engineer should emphasize the prohibition against discrimination on the basis of race, color, religion, sex, or national origin. This emphasis should be reflected in the minutes of such meetings.

Any employee who receives a discrimination complaint (verbal or otherwise) or observes a case of apparent discrimination should report the incident immediately through contractual channels for resolution or referral to the OFCCP.

5.18.2 Affirmative Action

Affirmative action programs to correct past discriminatory practices are permitted by the 1964 Civil Rights Act. Monitoring and enforcement responsibilities related to affirmative action programs are delegated to the Department of Labor, Office of Federal Contract Compliance Programs (OFCCP).

Affirmative action goals for the project are listed in FAR Provision 52.222-23, Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity for Construction. At preconstruction conferences, the Project Engineer should emphasize the Contractor's obligations to meet these goals and submit to submit all required forms. This emphasis will be reflected in the minutes of such conferences.

5.18.3 Reporting Requirements

5.18.3.1 Notice of Subcontract Award

FAR Provision 52.222-23, Notice of Requirement for Affirmative Action to Ensure Equal Opportunity requires the Contractor to provide written notification for each onsite subcontract (but not materials supply) exceeding \$10,000. The notification must be provided within 10 working days following award of the subcontract and shall list the following:

- Name, address, and telephone number of the subcontractor;
- Employer's identification number of the subcontractor;
- Estimated dollar amount of the subcontract;
- Estimated starting and completion dates of the subcontract; and
- Geographical area in which the subcontract is to be performed.

The information should be submitted to the OFCCP area/field office. A list of these offices can be found online at <http://www.dol.gov/esa/contacts/ofccp/ofnation2.htm>.

5.18.3.2 SF 100 (EEO-1)

This form is required by FAR Clause 52.222-26, Equal Opportunity. It is required to be submitted directly to the EEOC, Joint Reporting Committee, annually by March 31.

Veteran's Employment Report VETS-100

This is required by FAR Clause 52.222-37, Employment Reports on Special Disabled Veterans and Veterans of the Vietnam Era. It must be submitted annually by March 31 to the Department of Labor.

5.19 SUBCONTRACTING

The Standard Specifications permit subcontracting a portion of the work. The FAR specifically encourages subcontracting to small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged, and women owned small business concerns. However, the Contractor is usually required to perform, with its own organization, work amounting to not less than 50 percent of the original Contract amount. This requirement is contained in FAR Clause 52.236-1. In some contracts an alternate percentage may be inserted. Contracts, which are Small Business Set Asides, contain FAR Clause 52.219-14, which permits a far higher percentage of the work to be subcontracted (85% less materials). For most WFLHD contracts written consent to subcontract is not required. However, contracts and subcontractors may be required to furnish certain regulatory and administrative items prior to beginning work on a subcontract. These items are as listed below.

5.19.1 SF 1413, Statement and Acknowledgement

SF 1413 is a standard form in which the prime and the subcontractor certify that the standard labor provisions are included in the subcontract. This form is required for all subcontracts involving onsite (Davis-Bacon) labor. It must be submitted to the Government within 14 days of award of the prime contract or 14 of the award of any applicable subcontract. See Exhibit 5.19A, Subcontracting Statistics Forms Diagram Tree and Exhibits 5.19B through 5.19K for examples of completed SF1413 and WFLHD 130s for multiple-tiered subcontractors.

The completed SF 1413 and WFLHD 130 forms are to be routed through the Contract Administration Specialist to Central Files when received from Contractor.

5.19.2 WFLHD 130, Subcontractor Statistics

WFLHD 130 is designed to solicit certain data on the size and socio-economic status of the subcontractor in order to report such data accurately to the Small Business Administration. The form also provides for documentation of the amount subcontracted to date.

Prices shown should be based on the actual prices in the subcontract, regardless of the bid prices. Significant differences between the subcontracted prices and the bid prices should be reviewed with respect to the prime's entitlement to full progress payments. For example if the prime bid \$250,000 for clearing, but subcontracted the work for \$25,000, the bid item may be an improper augmentation to the mobilization item and should be questioned. The Contractor would be entitled to any amount bid, but the Government may take the position that these excess amounts cannot be paid early in the Contract because they represent payment for underbid work to be completed later in the Contract. Instead the payments should be prorated on a reasonable schedule, through the remaining Contract. Situations such as this must be discussed with the COE, who will probably seek legal advice before proceeding.

This form should be obtained from all subcontractors, including supply subcontracts, whether they involve onsite labor or not. See Exhibits 5.23B through 5.23K for example completed WFLHD 130, Subcontractor Statistics forms for multiple-tiered subcontractors.

5.19.3 Contracts Awarded to HUBZone Small Businesses

Contracts awarded to HUBZone small businesses under FAR Clause 52.219-3, Notice of Total HUBZone Small Business Set-Aside or FAR Clause 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns have additional monitoring requirements. These contracts require that at least 15 percent of the cost of the contract performance incurred for personnel will be spent on the concern's employees or the employees of other HUBZone small business concerns. The percentage of the cost of contract performance incurred for personnel will be computed as 100 percent of the total Davis-Bacon wages/benefits paid during the life of the contract less the combined Davis-Bacon wages/benefits paid during the life of the contract to subcontractor employees who do not work for a certified HUBZone Small Business. Certified payrolls will be used to evaluate Davis-Bacon wages and benefits paid.

5.19.4 Contracts Awarded to Large Business Concerns

Contracts which are awarded to large business concerns and which exceed \$1,000,000 (original contract amount) contain a Subcontracting Plan submitted by the Contractor and approved by the Contracting Officer. Failure to comply with these goals may result in liquidated damages being assessed in accordance with FAR Clause 52.219-16, Liquidated Damages - Small Business Subcontracting Plan. A contractor who is operating under a Subcontracting Plan is required to submit periodic documentation to the Small Business Administration through the Contracting Officer, FLHO and DOT.

SF-294, Subcontracting Report for Individual Contracts is required to be submitted semiannually on April 30 and October 30 each covering the semiannual periods ending March 31 and September 30.

SF-295, Summary Subcontract Report is required to be submitted annually on October 30 covering the fiscal year ending September 30.

5.19.5 Submitting Documentation

The COE should be advised when the Contractor fails to submit required documentation, when there is apparent noncompliance with the subcontracting plan or when the invoking of such damages is apparently warranted.

During the preconstruction conference the Contractor should be apprised in detail of the subcontracting requirements and the required certification forms should be discussed and made available at that time. It should be made clear to the Contractor that, insofar as the Government is concerned, the prime Contractor is responsible for all work subcontracted and re-subcontracted, and that all subcontracts must include the appropriate provisions of the original Contract.

5.19.6 Percent Subcontracted

In order to verify compliance with FAR Clause 52.236-1, Performance of Work by the Contractor, it is necessary, with each subcontract, to re-compute the amount of the original contract which the prime Contractor is performing with its own forces (labor). To calculate the amount of work being performed by the prime Contractor, you take what the prime Contractor performs on-site divided by the total contract amount. Supply type subcontracts do not count; nor do hauling subcontracts unless they are subject to Davis-Bacon.

FAR Clause 52.219-14, Limitations on Subcontracting, applies to Small Business Set Asides and 8(a) contracts. It permits the prime to perform as little as 15 percent of the amount of the original contract (exclusive of materials). Generally this percentage is so low, that as long as the prime has some presence on the site, including the submission of payrolls, no further documentation is necessary to verify the 15 percent requirement. If documentation is generated, the full amounts of all materials supply subcontracts (at any tier) must be deducted from the original Contract amount, and from the amounts of all subcontracts prior to computing the amount subcontracted.

5.19.7 Materials Supply Subcontracts

For purposes of computing the percent of subcontracted work, it is important to define a materials supply subcontract.

Materials supply subcontracts provide for the furnishing of materials that are to be incorporated in the work, such as concrete, steel and asphalt. Other materials such as form lumber, explosives or fuel do not count as materials supply subcontracts.

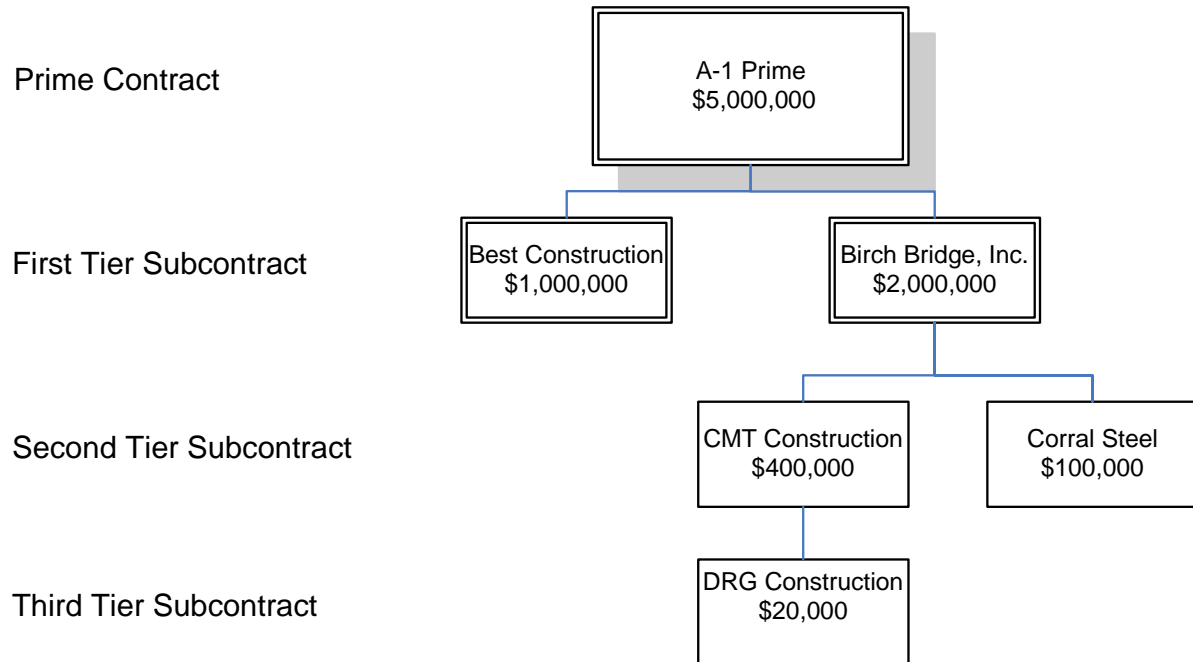
Such subcontracts must be in writing prior to the delivery of the material, and both parties (the Contractor and the supplier) must have mutually enforceable obligations under the subcontract. Usually the prime agrees to purchase certain quantities of materials, the supplier agrees to a specific price for the materials. Simple price quotes or the purchase of occasional concrete from a local supplier to build headwalls would usually not count as materials supply subcontracts.

Traditionally, in accordance with the Labor Department regulations, materials supply subcontractors were simply called "suppliers" rather than subcontractors. That remains true in all DOL laws and regulations. However the FAR defines suppliers as a form of subcontractor, not a separate entity. This is important when applying Prompt Payment and other non-Labor provisions in the Contract.

5.19.8 Small and Small Disadvantaged Business Concerns



The FAR encourages small business and small disadvantaged business subcontracting. In order to be a disadvantaged business as defined by the FAR, the company must also be a small business. Whether a company is a small business is determined by standards set by the Small Business Administration (SBA) and published in Part 19 of the FAR. A company's status also depends on the nature of the work it is doing. A company might be a large business as a general highway contractor, but a small business as an asphalt supplier.

Exhibits 5.19A through 5.19K are for multiple tiered subcontracts and are based on the following contractor / subcontractor setup.



SUBCONTRACTING STATISTICS FORMS DIAGRAM TREE

Exhibit 5.19A

STATEMENT AND ACKNOWLEDGMENT		OMB No.: 9000-0014 Expires:
Public reporting burden for this collection of information is estimated to average 1.5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (VRS), Office of Federal Acquisition and Regulatory Policy, GSA, Washington, DC 20405; and to the Office of Management and Budget, Paperwork Reduction Project (9000-0014), Washington, DC 20503.		
PART I - STATEMENT OF PRIME CONTRACTOR		
1. PRIME CONTRACT NO. DTFH70-01-C-00011	2. DATE SUBCONTRACT AWARDED 04/05/05	3. SUBCONTRACT NUMBER 01
4. PRIME CONTRACTOR (Name, address and ZIP code) A-1 Prime Anytown, Montana 59700		5. SUBCONTRACTOR (Name, address and ZIP code) Best Construction Anytown, Montana 59700
6. The prime contractor states that under the contract shown in item 1, a subcontract was awarded on the date shown in item 2 by (Name of Awarding Firm) <u>A-1 Prime</u> to the subcontractor identified in item 5, for the following work: Base Aggregate Crushing, Hauling, and Placing Select Topping Aggregate Crushing Asphalt Aggregate Crushing Road Maintenance Aggregate Crushing		
7. PROJECT Auto Tour Loop MT PFH 78-1(4)		8. LOCATION Sims, Montana
9. NAME AND TITLE OF PERSON SIGNING John Doe, President	10. BY (Signature) 	11. DATE SIGNED 04/05/05
PART II - ACKNOWLEDGMENT OF SUBCONTRACTOR		
12. The subcontractor acknowledges that the following clauses of the contract shown in item 1 are included in this subcontract: Contract Work Hours and Safety Standard Act - Overtime Compensation - Construction Payrolls and Basic Records Withholding of Funds Disputes Concerning Labor Standards Davis-Bacon Act Apprentices and Trainees Compliance with Copeland Regulations Subcontracts Contract Termination-Debarment Certification of Eligibility		
13. NAME(S) OF ANY INTERMEDIATE SUBCONTRACTORS, IF ANY		
14. NAME AND TITLE OF PERSON SIGNING Jim Smith, President	15. BY (Signature) 	16. DATE SIGNED 04/07/05
NSN 7540-01-151-4297 Previous edition is usable		STANDARD FORM 1413 (REV 9/98) Prescribed by GSA - FAR(48 CFR) 53.228(e)



SF 1413, STATEMENT AND ACKNOWLEDGEMENT

Exhibit 5.19B

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION WESTERN FEDERAL LANDS HIGHWAY DIVISION	
WFLHD Form No. 130 5/00	
ATTN: Prime Contractor - This form shall be completed for EACH subcontract.	
	Report No. <u>01</u>
Contract No: <u>DTFH70-01-C-000</u>	Date <u>04/05/05</u>
Project Name & No: <u>Auto Tour Loop MT PFH 78-1(4)</u>	
Prime Contractor Name: <u>A-1 Prime</u>	
Subcontractor Statistics	
Name:	<u>Best Construction</u>
Address:	<u>Anytown, Montana 59700</u>
Subcontracted Work: <u>Base(placing); Select Topping; Asphalt; and Maintenance Aggregate Crush</u>	
Total amount sublet to the above contractor	\$ <u>1,000,000.00</u>
Amount previously contracted	\$ _____
Amount sublet to date:	\$ <u>1,000,000.00</u>
Original Contract Amount	\$ <u>5,000,000.00</u>
Total Percent subcontracted <u>20</u> %	
Check applicable description(s) of subcontractor:	
<input type="checkbox"/> Small Business	<input type="checkbox"/> Small Disadvantaged Business
<input checked="" type="checkbox"/> Women-owned Business	<input checked="" type="checkbox"/> HUBZone Small Business
<input type="checkbox"/> Veteran-owned Small Business	<input type="checkbox"/> Service-disabled Veteran-owned Small Business
<input type="checkbox"/> None of the Above	
As an authorized signatory for the prime contractor, I acknowledge and certify that all of the required contract clauses (including labor clauses) have been incorporated into and made a part of this subcontract. The amounts and percentages shown above are true and accurately stated.	
Signature:	Date: <u>04/05/05</u>
Name & Title: <u>John Doe, President</u>	

WFLHD 130, SUBCONTRACTOR STATISTICS

Exhibit 5.19C



STATEMENT AND ACKNOWLEDGMENT		OMB No.: 9000-0014 Expires:		
<p>Public reporting burden for this collection of information is estimated to average 1.5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (VRS), Office of Federal Acquisition and Regulatory Policy, GSA, Washington, DC 20405; and to the Office of Management and Budget, Paperwork Reduction Project (9000-0014), Washington, DC 20503.</p>				
PART I - STATEMENT OF PRIME CONTRACTOR				
1. PRIME CONTRACT NO. DTFH70-01-C-00011	2. DATE SUBCONTRACT AWARDED 04/08/05	3. SUBCONTRACT NUMBER 02		
4. PRIME CONTRACTOR (Name, address and ZIP code) A-1 Prime Anytown, Montana 59700		5. SUBCONTRACTOR (Name, address and ZIP code) Birch Bridge, Inc. Anytown, Montana 59700		
<p>6. The prime contractor states that under the contract shown in Item 1, a subcontract was awarded on the date shown in Item 2 by (Name of Awarding Firm) <u>A-1 Prime</u> to the subcontractor identified in Item 5, for the following work:</p> <p>Bridge construction, including concrete, reinforcing steel, waterproofing, barrier, temporary bridge, and drilled shafts.</p>				
7. PROJECT Auto Tour Loop MT PFH 78-1(4)		8. LOCATION Sims, Montana		
9. NAME AND TITLE OF PERSON SIGNING John Doe, President	10. BY (Signature) 	11. DATE SIGNED 04/08/05		
PART II - ACKNOWLEDGMENT OF SUBCONTRACTOR				
<p>12. The subcontractor acknowledges that the following clauses of the contract shown in Item 1 are included in this subcontract:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> Contract Work Hours and Safety Standard Act - Overtime Compensation - Construction Payrolls and Basic Records Withholding of Funds Disputes Concerning Labor Standards </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> Davis-Bacon Act Apprentices and Trainees Compliance with Copeland Regulations Subcontracts Contract Termination-Debarment Certification of Eligibility </td> </tr> </table>			<ul style="list-style-type: none"> Contract Work Hours and Safety Standard Act - Overtime Compensation - Construction Payrolls and Basic Records Withholding of Funds Disputes Concerning Labor Standards 	<ul style="list-style-type: none"> Davis-Bacon Act Apprentices and Trainees Compliance with Copeland Regulations Subcontracts Contract Termination-Debarment Certification of Eligibility
<ul style="list-style-type: none"> Contract Work Hours and Safety Standard Act - Overtime Compensation - Construction Payrolls and Basic Records Withholding of Funds Disputes Concerning Labor Standards 	<ul style="list-style-type: none"> Davis-Bacon Act Apprentices and Trainees Compliance with Copeland Regulations Subcontracts Contract Termination-Debarment Certification of Eligibility 			
13. NAME(S) OF ANY INTERMEDIATE SUBCONTRACTORS, IF ANY				
14. NAME AND TITLE OF PERSON SIGNING Jack Shaft, President	15. BY (Signature) 	16. DATE SIGNED 04/08/05		
<small>NSN 7540-01-151-4297 Previous edition is usable</small>		<small>STANDARD FORM 1413 (REV 9/98) Prescribed by GSA - FAR(48 CFR) 53.228(e)</small>		

SF 1413, STATEMENT AND ACKNOWLEDGEMENT

Exhibit 5.19D


U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION WESTERN FEDERAL LANDS HIGHWAY DIVISION	
WFLHD Form No. 130 5/00	
ATTN: Prime Contractor - This form shall be completed for EACH subcontract.	
	Report No. <u>02</u>
Contract No: <u>DTFH70-01-C-00C</u>	Date <u>04/08/05</u>
Project Name & No: <u>Auto Tour Loop MT PFH 78-1(4)</u>	
Prime Contractor Name: <u>A-1 Prime</u>	
Subcontractor Statistics	
Name:	<u>Birch Bridge, Inc.</u>
Address:	<u>Anytown, Montana 59700</u>
Subcontracted Work: <u>Bridge construction concrete, reinforcing steel, waterproofing, temp. bridge,</u>	
Total amount sublet to the above contractor	\$ <u>2,000,000.00</u>
Amount previously contracted	\$ <u>1,000,000.00</u>
Amount sublet to date:	\$ <u>3,000,000.00</u>
Original Contract Amount	\$ <u>5,000,000.00</u>
Total Percent subcontracted	<u>60</u> %
Check applicable description(s) of subcontractor:	
<input type="checkbox"/> Small Business	<input type="checkbox"/> Small Disadvantaged Business
<input type="checkbox"/> Women-owned Business	<input type="checkbox"/> HUBZone Small Business
<input checked="" type="checkbox"/> Veteran-owned Small Business	<input type="checkbox"/> Service-disabled Veteran-owned Small Business
	<input type="checkbox"/> None of the Above
As an authorized signatory for the prime contractor, I acknowledge and certify that all of the required contract clauses (including labor clauses) have been incorporated into and made a part of this subcontract. The amounts and percentages shown above are true and accurately stated.	
Signature:	Date: <u>04/08/05</u>
Name & Title: <u>John Doe, President</u>	

WFLHD 130, SUBCONTRACTOR STATISTICS**Exhibit 5.19E**

STATEMENT AND ACKNOWLEDGMENT		OMB No.: 9000-0014 Expires:
<p>Public reporting burden for this collection of information is estimated to average 1.5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (VRS), Office of Federal Acquisition and Regulatory Policy, GSA, Washington, DC 20405; and to the Office of Management and Budget, Paperwork Reduction Project (9000-0014), Washington, DC 20503.</p>		
PART I - STATEMENT OF PRIME CONTRACTOR		
1. PRIME CONTRACT NO. DTFH70-01-C-00011	2. DATE SUBCONTRACT AWARDED 04/07/05	3. SUBCONTRACT NUMBER 02-A
4. PRIME CONTRACTOR (Name, address and ZIP code) A-1 Prime Anytown, Montana 59700		5. SUBCONTRACTOR (Name, address and ZIP code) Corral Steel Anytown, Montana 59700
6. The prime contractor states that under the contract shown in Item 1, a subcontract was awarded on the date shown in Item 2 by (Name of Awarding Firm) <u>Birch Bridge, Inc.</u> to the subcontractor identified in Item 5, for the following work: Reinforcing Steel		
7. PROJECT Auto Tour Loop MT PFH 78-1(4)		8. LOCATION Sims, Montana
9. NAME AND TITLE OF PERSON SIGNING John Doe, President	10. BY (Signature) 	11. DATE SIGNED 04/07/05
PART II - ACKNOWLEDGMENT OF SUBCONTRACTOR		
12. The subcontractor acknowledges that the following clauses of the contract shown in Item 1 are included in this subcontract:		
<ul style="list-style-type: none"> Contract Work Hours and Safety Standard Act - Overtime Compensation - Construction Payrolls and Basic Records Withholding of Funds Disputes Concerning Labor Standards 	<ul style="list-style-type: none"> Davis-Bacon Act Apprentices and Trainees Compliance with Copeland Regulations Subcontracts Contract Termination-Debarment Certification of Eligibility 	
13. NAME(S) OF ANY INTERMEDIATE SUBCONTRACTORS, IF ANY Birch Bridge, Inc.		
14. NAME AND TITLE OF PERSON SIGNING Jimmy Smitt, President	15. BY (Signature) 	16. DATE SIGNED 04/09/05
<small>NSN 7540-01-151-4297 Previous edition is usable</small>		STANDARD FORM 1413 (REV 9/98) <small>Prescribed by GSA - FAR(48 CFR) 53.228(e)</small>

SF 1413, STATEMENT AND ACKNOWLEDGEMENT

Exhibit 5.19F



**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION**

WFLHD Form No. 130
500

ATTN: Prime Contractor - This form shall be completed for EACH subcontract.

Report No. 02-A

Contract No: DTFH70-01-C-00C Date 04/07/05

Project Name & No: Auto Tour Loop MT PFH 78-1(4)

Prime Contractor Name: A-1 Prime - 1st. tier: Birch Bridge Inc.

Subcontractor Statistics

Name: 2nd. tier: Corral Steel

Address: Anytown, Montana 59700


Subcontracted Work: Reinforcing Steel

Total amount sublet to the above contractor	\$ <u>100,000.00</u>
Amount previously contracted	\$ <u>0.00</u>
Amount sublet to date:	\$ <u>100,000.00</u>
Original Contract Amount	\$ <u>2,000,000.00</u>
Total Percent subcontracted	<u>5</u> %

Check applicable description(s) of subcontractor:

<input type="checkbox"/> Small Business	<input checked="" type="checkbox"/> Small Disadvantaged Business
<input checked="" type="checkbox"/> Women-owned Business	<input type="checkbox"/> HUBZone Small Business
<input type="checkbox"/> Veteran-owned Small Business	<input type="checkbox"/> Service-disabled Veteran-owned Small Business
	<input type="checkbox"/> None of the Above



As an authorized signatory for the prime contractor, I acknowledge and certify that all of the required contract clauses (including labor clauses) have been incorporated into and made a part of this subcontract. The amounts and percentages shown above are true and accurately stated.

Signature:  Date: 04/07/05

Name & Title: John Doe, President

WFLHD 130, SUBCONTRACTOR STATISTICS

Exhibit 5.19G

STATEMENT AND ACKNOWLEDGMENT		OMB No.: 9000-0014 Expires:
Public reporting burden for this collection of information is estimated to average 1.5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (VRS), Office of Federal Acquisition and Regulatory Policy, GSA, Washington, DC 20405; and to the Office of Management and Budget, Paperwork Reduction Project (9000-0014), Washington, DC 20503.		
PART I - STATEMENT OF PRIME CONTRACTOR		
1. PRIME CONTRACT NO. DTFH70-01-C-00011	2. DATE SUBCONTRACT AWARDED 04/07/05	3. SUBCONTRACT NUMBER 02-B
4. PRIME CONTRACTOR (Name, address and ZIP code) A-1 Prime Anytown, Montana 59700		5. SUBCONTRACTOR (Name, address and ZIP code) CMT Construction Anytown, Montana 59700
6. The prime contractor states that under the contract shown in Item 1, a subcontract was awarded on the date shown in Item 2 by (Name of Awarding Firm) <u>Birch Bridge, Inc.</u> to the subcontractor identified in Item 5, for the following work: Detour Bridge		
7. PROJECT Auto Tour Loop MT PFH 78-1(4)		8. LOCATION Sims, Montana
9. NAME AND TITLE OF PERSON SIGNING John Doe, President	10. BY (Signature) 	11. DATE SIGNED 04/07/05
PART II - ACKNOWLEDGMENT OF SUBCONTRACTOR		
12. The subcontractor acknowledges that the following clauses of the contract shown in Item 1 are included in this subcontract:		
Contract Work Hours and Safety Standard Act - Overtime Compensation - Construction Payrolls and Basic Records Withholding of Funds Disputes Concerning Labor Standards	Davis-Bacon Act Apprentices and Trainees Compliance with Copeland Regulations Subcontracts Contract Termination-Debarment Certification of Eligibility	
13. NAME(S) OF ANY INTERMEDIATE SUBCONTRACTORS, IF ANY Birch Bridge, Inc.		
14. NAME AND TITLE OF PERSON SIGNING Jack Frist, President	15. BY (Signature) 	16. DATE SIGNED 04/08/05
NSN 7540-01-151-4297 Previous edition is usable		STANDARD FORM 1413 (REV 9/98) Prescribed by GSA - FAR(48 CFR) 53.228(e)

SF 1413, STATEMENT AND ACKNOWLEDGEMENT

Exhibit 5.19H

**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION**

WFLHD Form No. 130
500

ATTN: Prime Contractor - This form shall be completed for EACH subcontract.

Report No. 02-B

Contract No: DTFH70-01-C-00C Date 04/07/05

Project Name & No: Auto Tour Loop MT PFH 78-1(4)

Prime Contractor Name: A-1 Prime - 1st. tier: Birch Bridge Inc.

Subcontractor Statistics

Name: 2nd. tier: CMT Construction

Address: Anytown, Montana 59700

Subcontracted Work: Detour Bridge

Total amount sublet to the above contractor	\$ <u>400,000.00</u>
Amount previously contracted	\$ <u>100,000.00</u>
Amount sublet to date:	\$ <u>500,000.00</u>
Original Contract Amount	\$ <u>2,000,000.00</u>
Total Percent subcontracted	<u>25</u> %

Check applicable description(s) of subcontractor:

<input checked="" type="checkbox"/> Small Business	<input type="checkbox"/> Small Disadvantaged Business
<input type="checkbox"/> Women-owned Business	<input type="checkbox"/> HUBZone Small Business
<input type="checkbox"/> Veteran-owned Small Business	<input type="checkbox"/> Service-disabled Veteran-owned Small Business
	<input type="checkbox"/> None of the Above



As an authorized signatory for the prime contractor, I acknowledge and certify that all of the required contract clauses (including labor clauses) have been incorporated into and made a part of this subcontract. The amounts and percentages shown above are true and accurately stated.

Signature: Date: 04/07/05

Name & Title: John Doe, President


WFLHD 130, SUBCONTRACTOR STATISTICS

Exhibit 5.19I

STATEMENT AND ACKNOWLEDGMENT		OMB No.: 9000-0014 Expires:
Public reporting burden for this collection of information is estimated to average 1.5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (VRS), Office of Federal Acquisition and Regulatory Policy, GSA, Washington, DC 20405; and to the Office of Management and Budget, Paperwork Reduction Project (9000-0014), Washington, DC 20503.		
PART I - STATEMENT OF PRIME CONTRACTOR		
1. PRIME CONTRACT NO. DTFH70-01-C-00011	2. DATE SUBCONTRACT AWARDED 04/09/05	3. SUBCONTRACT NUMBER 02-B(1)
4. PRIME CONTRACTOR (Name, address and ZIP code) A-1 Prime Anytown, Montana 59700		5. SUBCONTRACTOR (Name, address and ZIP code) DRG Inc. Anytown, Montana 59700
6. The prime contractor states that under the contract shown in Item 1, a subcontract was awarded on the date shown in Item 2 by (Name of Awarding Firm) <u>CMT Construction</u> to the subcontractor identified in Item 5, for the following work: Placement of detour bridge.		
7. PROJECT Auto Tour Loop MT PFH 78-1(4)		8. LOCATION Sims, Montana
9. NAME AND TITLE OF PERSON SIGNING John Doe, President	10. BY (Signature) 	11. DATE SIGNED 04/07/05
PART II - ACKNOWLEDGMENT OF SUBCONTRACTOR		
12. The subcontractor acknowledges that the following clauses of the contract shown in Item 1 are included in this subcontract:		
Contract Work Hours and Safety Standard Act - Overtime Compensation - Construction Payrolls and Basic Records Withholding of Funds Disputes Concerning Labor Standards	Davis-Bacon Act Apprentices and Trainees Compliance with Copeland Regulations Subcontracts Contract Termination-Debarment Certification of Eligibility	
13. NAME(S) OF ANY INTERMEDIATE SUBCONTRACTORS, IF ANY Birch Bridge, Inc.		
14. NAME AND TITLE OF PERSON SIGNING Bob Smyth, President	15. BY (Signature) 	16. DATE SIGNED 04/10/05
NSN 7540-01-151-4297 Previous edition is usable		STANDARD FORM 1413 (REV 9/98) Prescribed by GSA - FAR(48 CFR) 53.228(e)

SF 1413, STATEMENT AND ACKNOWLEDGEMENT

Exhibit 5.19J



**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION**

WFLHD Form No. 130
500

ATTN: Prime Contractor - This form shall be completed for EACH subcontract.

Report No. 02-B(1)

Contract No: DTFH70-01-C-00C Date 04/07/05

Project Name & No: Auto Tour Loop MT PFH 78-1(4)

Prime Contractor Name: A-1 Prime - 1st. tier: Birch Bridge Inc. - 2nd tier: CMT Construction

Subcontractor Statistics

Name: 3rd. tier: DRG, Inc.

Address: Anytown, Montana 59700


Subcontracted Work: Placement of detour Bridge

Total amount sublet to the above contractor	\$	<u>20,000.00</u>
Amount previously contracted	\$	<u>0.00</u>
Amount sublet to date:	\$	<u>20,000.00</u>
Original Contract Amount	\$	<u>400,000.00</u>
Total Percent subcontracted		<u>5</u> %

Check applicable description(s) of subcontractor:

<input checked="" type="checkbox"/> Small Business	<input type="checkbox"/> Small Disadvantaged Business
<input type="checkbox"/> Women-owned Business	<input type="checkbox"/> HUBZone Small Business
<input type="checkbox"/> Veteran-owned Small Business	<input type="checkbox"/> Service-disabled Veteran-owned Small Business
	<input type="checkbox"/> None of the Above

As an authorized signatory for the prime contractor, I acknowledge and certify that all of the required contract clauses (including labor clauses) have been incorporated into and made a part of this subcontract. The amounts and percentages shown above are true and accurately stated.

Signature:  Date: 04/07/05

Name & Title: John Doe, President

WFLHD 130, SUBCONTRACTOR STATISTICS

Exhibit 5.19K

5.20 CONTRACT TIME

The time allowed for completion of the work will be based on a specified completion date as stated in FAR 52.211-10. All work on the project is to be completed no later than on the date specified in the Contract, as adjusted under the Contract provisions.

5.20.1 Failure to Complete Work Within the Time Allowed

If the Contractor fails to complete the work by the close of business on the specified completion date (as adjusted), the charge of contract time and the attendant liquidated damages will include each calendar day between the specified completion date and the actual date of substantial completion.

Substantial completion is defined in FP Subsection 101.04 as: The point at which the project is complete such that it can be safely and effectively used by the public without further delays, disruption, or other impediments. For conventional bridge and highway work, the point at which all bridge deck, parapet, pavement structure, shoulder, drainage, sidewalk, permanent signing and markings, traffic barrier, safety appurtenance, utility, and lighting work is complete.

5.20.2 Methods of Adjusting Time Allowance

Adjustments in contract time are permitted under the following clauses:

FAR 52.211-10, Commencement, Prosecution, and Completion of Work
FAR 52.211-18, Variation in Estimated Quantity
FAR 52.242-14, Suspension of Work
FAR 52.236-2, Differing Site Conditions
FAR 52.243-4, Changes
FAR 52.249-10, Default (Fixed Price-Construction)

General information regarding time extensions is included in FP Subsection 108.03, Determination and Extension of Contract Time.

Increases in contract time may be authorized as follows:

By supplemental agreement which includes a revised fixed completion date.

By change order providing a unilateral revised fixed completion date for performing work for which there has been no agreement.

By supplemental agreement issued in settlement of a claim.

By Contracting Officer's decision in accordance with FAR Clause 52.233.1, Disputes.

5.20.3 Consideration of Time Adjustments

When contract modifications are issued, consideration must be given to the modification's effect on overall contract time. Failure to grant a time extension for increased work or changed work with a definite bearing on time for performance may result in an acceleration claim. If it is critical that the original contract completion date be maintained, it may be in the Government's interest to compensate the

Contractor for accelerating the work to meet the original completion date. Generally, time adjustments will not be made unless the modification or change in work is on the critical path items.

When an adjustment in contract time is negotiated, it must be ensured that the proposed adjustment is in accordance with the Contract provisions and is fair to both the Contractor and the Government. The actual time allowed should be tailored to the particular change situation along with consideration of the effect on non-changed work as to total Contract performance time. Consider the time of performance of the changed work and the need to acquire and mobilize/demobilize equipment to perform the work.

Unusual weather patterns impacting the work should be considered as appropriate. The Project Engineer should obtain rainfall information from local weather data centers for the past 10-year period to provide a base for any adjustments. Rainfall and other weather conditions should be documented throughout the life of the project.

Ideally, contract time should be determined by the effect of the change on the construction schedule, which is current at the time of the change. Each modification should be clear and specific as to its effect on contract time such that all parties recognize and agree to the impact of the changed work.

A reduction in performance time to less than the original number of days allowed in the contract is rarely necessary, but is provided for under the Contract where early delivery of the facility is in the public interest. When a decrease in performance time is contemplated, the contract modification should be negotiated (a unilateral order is inappropriate) and an equitable adjustment is normally required.

5.21 WORK SUSPENSIONS AND STOP ORDERS

5.21.1 Definitions

The word suspension is commonly used in the FAR as meaning a suspension for the convenience of the Government pursuant to *FAR Clause 52.242-14, Suspension of Work*, i.e. a suspension which implies liability or potential liability to the Government. In Federal Lands, on the other hand, the word suspension has been most often used to describe directives to suspend due to unsuitable weather or failure of the Contractor to comply with contract requirements, neither of which implies liability to the Government. To resolve this inconsistency the following terms are defined to distinguish between these conditions.

- **Suspension:** An interruption, delay, or halting of all or any part of the work by, and for the convenience of the Government, or resulting from an act (or failure to act) of the Contracting Officer. (See FAR 52.242-14, Suspension of Work).
- **Stop Order:** An interruption, delay, or halting by the Government, of all or any part of the work resulting from unsuitable weather or soil conditions, an act of the Contractor, or the failure of the Contractor to act. (See FP Subsection 108.05)

5.21.2 Suspension of Contractor Operations

FAR 52.242-14 permits work to be suspended for the convenience of the Government. If a suspension is for longer than a *reasonable* time the Contractor may be entitled to an equitable adjustment. What is *reasonable* depends on the circumstances, and the liability of the Government for not suspending should be considered.

For example if the Contractor begins excavating from a Government designated borrow source, and it becomes apparent that the material may be unsuitable for its intended use, a suspension for one day to decide if it is in fact unsuitable would probably be reasonable. If the Government decided after one day that the source was acceptable, it could argue that no liability was incurred.

Authority to issue emergency or urgent suspensions within the window of *reasonableness* may be delegated to the Project Manager. Once it is recognized that the suspension will result in liability to the Government, the letter or notice ordering the suspension of work, or documenting the suspension after the fact, shall be issued by the COE or the Construction Engineer depending on Division delegations.

Constructive suspensions of work can occur by failure of the Government to act. For example:

- Failure to approve shop drawings or mix designs within the time period specified in the Contract, or within a reasonable time if not specified
- Failure to perform timely inspections
- Delays due to defective specifications

5.21.3 Stoppage of Contractor Operations

The Standard Specifications permit the Contracting Officer to stop the work wholly or in part due to the following:

1. Weather or soil conditions considered unsuitable for prosecution of the work

When the Contractor fails to act responsibly by voluntarily stopping operations when weather or soil conditions are unsuitable, the Project Engineer may issue a letter ordering work to stop. Normally this would be done only if the Contractor's continued work was causing damage to previously completed work, adjacent public or private property, or otherwise causing a potential liability to the Government.

In the letter, describe the problem, which makes conditions unsuitable for work and the condition(s), which must exist before work can be resumed.

No order is required when the Contractor elects to stop work because of unsuitable conditions, which are usually of short duration and expected during the project duration. However, the project records should document and indicate such periods of no work.

For completion date contracts, there is no *counting* of contract time; therefore, normal unsuitable weather or soil conditions have no effect on the completion date. However, a time extension and new completion date may be established if the Contractor can demonstrate the amount of unsuitable weather is extraordinary or unusually severe. Such a demonstration will require careful review and documentation of weather history in the project area. In the event the Government agrees the weather is unusually severe, the completion date may be adjusted by contract modification. Such an adjustment is not dependent on a stop order having been issued by the Government, but only on the weather being demonstrated as unusually severe, and adversely impacting the Contractor's progress.

2. Failure of the Contractor to:

- a) Correct conditions unsafe for the workers or the general public.
- b) Carry out orders given by the Contracting Officer.
- c) Perform any provision of the contract.

In cases where these conditions exist, the Project Engineer should issue the Contractor a written notice covering the deficiencies that require correction. The notice should include a statement that failure to immediately take corrective action may result in the issuance of a stop order covering the work in question. At the same time, the Project Engineer should notify the COE by telephone and request instructions.

If the Contractor refuses or fails to correct the identified deficiencies, the Project Engineer may issue a stop order for periods of short duration due to reasons 1. and 2.(a) above. Stop orders for long durations or those due to reasons 2.(b) or 2.(c) shall be issued by, or have the concurrence of, the COE or the Construction Engineer.

Stop orders should cover only those items of work that are deficient. Stopping other work may be construed as punitive; stop orders or suspensions are not to be punitive.

5.21.4 Content of Suspensions and Stop Orders

Use a letter format for suspensions and stop orders, and include the following information:

1. Date, Contractor's name and address, contract number, and project designation.
2. Reason for suspension or stop order and whether the order pertains to all work underway or only part of the work. If the suspension or stop order affects only part of the work, describe that work which is affected.

For stop orders covered by Subsection 108.05 of the FP, cite that provision.

For suspensions of work for the convenience of the Government, cite *FAR Clause 52.242-14, Suspension of Work*.

3. Effective date of suspension or stop order.
4. Statement that work will not be resumed until directed in writing. For work stopped under Section 108.05, include a description of what conditions must exist before the Contractor can resume work.
5. A statement regarding the effect of the suspension or stop order on the contract time and amount. If an unusually severe weather-related delay is recognized by the Government, note that a contract modification may be requested adjusting contract time.

For other stop orders covered by Subsection 108.05 include a statement that says there will be no change in contract completion date or contract amount.

For suspensions of work for the convenience of the Government, state that any adjustment(s) to the contract completion date or amount as a result of the suspension will be made by contract modification.

The Contractor should be requested to acknowledge receipt of all suspensions and stop orders. If the Contractor's superintendent is absent, or due to strained relations, refuses to acknowledge the letter, its delivery should be noted in the diary and a copy sent to the Contractor's main office.

5.21.4.1 Example Suspension Letter (Content Only)

This confirms the September 1 telephone conversation in which you were verbally ordered to cease grading operations between Stations 115+00 and 130+00 because of the anticipated repair of a main gas line adjacent to the project by CP&L Gas Company. This suspension is for the convenience of the Government, FAR Clause 52.212-12.

You may resume work in the above vicinity effective September 10, 2005.

Since Item 102(1), Unclassified Excavation, is a critical path item, the contract completion date will be extended by 8 days. A contract modification will be prepared and issued reflecting this adjustment. If you believe that you incurred an increased in the cost of performance of the Contract as a result of this suspension, you may submit a cost proposal for the consideration of the Government.

5.21.4.2 Example Stop Work Order Letters (Content Only)

Example 1

Due to safety hazards to the public, aggravated by your hauling operations on Mountain Road in the rain and fog, you are hereby directed to discontinue this operation during periods when visibility is less than 300 meters. If there is doubt as to the evaluation of this criterion, WFLHD's on-site inspector is empowered to make determinations as to when hauling may take place

This order is issued pursuant to FP-03, Section 108.05(a). Since these weather conditions are normal this time of the year, and you are obligated to accommodate normal weather conditions in safely constructing the project, no adjustment will be in the contract amount or the contract completion date of September 1, 2009.

Example 2

By letter dated September 1, you were instructed to clear Station 210+00 to 215+00 of remaining timber slash and vegetation in accordance with Subsection 204.04, of the Contract, prior to initiating excavation in this area. Your forces have started excavating cut material in this area several times over the last two weeks. However, as we have discussed on several occasions, the clearing and grubbing has not been completed.

Since you have failed to perform the work require by the Contract, stop all excavation operations within the above noted limits effective September 15. This stop order is issued is in accordance with subsection 108.05(b) of the FP-92.

Work may resume at such time the area is cleared of all slash, debris and vegetation.

No adjustments to the contract completion date or the contract amount will be made as a result of this order.

5.21.5 Content of Resumption Orders

After the reasons for a suspension or stop order have been resolved, provide a written resumption order to the Contractor to rescind the suspension or stop order. The resumption order should be signed by, or have the concurrence of the official who signed the suspension or stop order. The order should include the following:

1. Date, Contractor's name and address, contract number, and project designation.
2. Reference the suspension or stop order, and identification of the item(s) of work affected by the resumption.
3. Effective date of resumption.
4. A statement regarding the effect of the suspension or stop order on the Contract time and amount.

Resumption orders after periods of short duration may be made effective immediately if conditions permit normal resumption of the work. After long suspension periods, resumption orders should be issued sufficiently in advance of the effective date to permit the Contractor to coordinate the start-up of work. The Contractor should be requested to acknowledge receipt of all letters to resume work.

5.22 STAKING

Unless otherwise stated in the contract, the Government will have set horizontal and vertical control points of the project, and all other staking is to be performed by the contractor. Control points found to be missing by the contractor and deemed necessary by the CO for the control of the work will either be reestablished by the Government or the contractor will be equitably compensated for the reestablishment by contract modification.

The Government will usually furnish data relating to horizontal and vertical alignment, theoretical slope stake catch points, and other pertinent design data to stake and build the project. This does not mean that all the required staking information will be furnished in whole or in a format normally used by every contractor. The contractor may be required to use calculations or other methods, such as computer programs to manipulate the furnished information to obtain staking information for particular portions of the project, and to get the information into a format that is easily used by their forces.

The project staff should randomly check at least 10% of each of the contractor's staking operations. If 10% or more of the checks are out of contract specification it can be deduced that the problem is not isolated and the contractor should be required to correct the entire area that was checked. If this becomes a regular occurrence the contractor is to be notified in writing that their QC plan and/or QC procedures need to be corrected. If this does not correct the deficiencies then a written order stopping the unacceptable operations until acceptable work can be performed should be considered and discussed with the COE.

5.22.1 Verification of Staking Documents

The first step in verifying the accuracy of the survey control is taken before any work has been done by the Contractor. The Project Engineer is to receive copies of such documents as: earthwork listing, cross sections, clearing book, slope stake book, coordinate listing, etc. A list of such documents is called out in the special contract requirements to be made available to the Contractor. The Project Engineer needs to cross check this information with the plans to insure consistency. Sometimes the plans contain control point coordinates. The Project Engineer should compare these coordinates with the data listing. The Project Engineer should calculate some coordinates of PC's, PT's, etc., using data from the Plans. Then the Project Engineer should compare the calculated coordinates with the design listing. The Project Engineer should contact the COE and then the Design Section for help if discrepancies are found or if questions develop.

5.22.2 Government Field Control

The next phase of staking verification is in the field. Initial project surveys are done by WFLHD or a consultant surveyor under a separate contract, before the award of the construction contract. Such surveys will provide control points to be used later by the Contractor.

If the design line staking is still available, or if the Contractor has staked the alignment, it is good practice to verify that the information in both the special contract requirements and the plans match and fit with what is in the field. The Project Engineer should walk the design line with the plans and cross sections to verify that enough survey control points exist to construct the project. (It is not uncommon for some of these points to be destroyed or moved between the time of staking and the time of award of the construction contract.) Walking the alignment is also a good opportunity for the Project Engineer to become familiar with the design and to note which control points will need to be relocated by the contractor prior to being destroyed by construction operations.

The Project Engineer should assume the quality of the Government control is adequate for the project, unless there is reason to believe it may have been disturbed, or unless the Contractor's beginning survey efforts lead to questions or allegations of errors. If errors are alleged or suspected for any reason, the COE is to be quickly consulted to arrange for or provide expert advice and/or assistance.

If so many Government control points have been lost or disturbed that replacement by available project staff is not feasible, the Project Engineer should contact the COE. Options available to reset the control points include:

- A contract modification to have the Contractor do the work
- Contracting with a local surveyor
- Bringing in a Government survey crew
- Temporary additional project staff

Any needed work relating to control points should be done as soon as possible to avoid delaying the Contractor's operations.

5.22.3 Establishing and Referencing Centerline and/or other Roadway Control

At some point during construction of the project, the centerline is established by the Contractor. Shoulder points are often set in the same operation. The degree of accuracy depends on the phase of construction taking place. Most staking tolerances are found in the specifications. When they are not, standard practice for the type of work will govern.

During initial grading, the inspector can check work by measuring from the slope stakes or the slope stake reference hubs. When doing this, the inspector should line up with the reference hub or the slope stake on the other side of the road. This insures that centerline is intercepted at the station listed on the stake. Use of a cloth tape and hand level should be adequate at this stage, so long as the Contractor's work is being found generally in compliance. Tools such as the Rhodes Arc or Easy Arc are convenient for steep terrain. If it appears there are serious or chronic errors, more accurate checking methods may be warranted.

When finishing subgrade, fine grade control stakes (blue tops) or stakes for string lining are set by the Contractor. Usually, a Contractor sets the horizontal location of grade control stakes for about 1,000 meters of roadway, then comes back to set the proper elevations. To check the work at this stage, the inspector should have a total station and level. Radial survey methods can then be used. By occupying a point of known coordinates and having a similar backsight you can check the Contractor's grade control stakes.

Regardless of the method chosen for checking, the Project Engineer should perform as independent a check as is feasible. Occupying points different from those used by the Contractor, or using a different method, are approaches to that. The purpose of an independent check is to lessen the chance of duplicating any error. Points set for checking may not match the Contractor's points exactly, but they should fall within tolerances.

Referencing centerline, as used in this section, means to set additional control outside of the construction limits, and out of harm's way generally. These references are used to reestablish centerline or other control points. The control referenced may be any of PC's, PT's, P-line points, state coordinate points, etc.

A wide range of methods exists to reference centerline depending on the equipment available and the importance of the point. Regardless of how the Contractor references centerline, a record is to be given the Project Engineer, in an acceptable format. The Project Engineer should mathematically check a sampling of calculations, and should field-check some of the reference points in order to verify the competence of the Contractor's work. Field verification consists of making sure the references do exist,

insuring that references are out of harm's way, and checking that the points match the data submitted by the Contractor. The Project Engineer should check enough points to feel satisfied that all are correct. The Contractor is to be notified of any discrepancies found and required to correct anything that will be left in place.

Where construction plans show equations in the stationing, these equations must be left in, and the station ahead must not be altered. The back station may be corrected if any error or distance is found when rerunning the line. This is necessary to preserve the relation of centerline to landmarks.

If the stationing at the crossing of property lines does not agree with the original plans (except minor differences in chainage), it will be necessary to equate to the original station ahead. The Project Engineer should coordinate with the COE and Project Development when any changes are necessary that affect the right-of-way description.

The terminal stations of the project should be left as shown on the plans, unless, a change has been approved by Project Development through the COE. If errors, equations or centerline corrections cause a terminal station to be in a significantly different location relative to the geometrics of the road and physical features of the right-of-way, the Project Engineer should coordinate with the COE to see if an equation or a revision to the terminal station is appropriate. Such actions should be kept to a minimum.

5.22.4 Permanent Monuments

Permanent monuments such as United States Coast and Geodetic Survey (USCGS) monuments, Public Land corners, State coordinate points, Corps of Engineers monuments, or property corners might be in the way of the work. The Contract should provide for relocation of such monuments before construction, in accord with legal and/or agency requirements. If a monument is discovered that is not called out in the Contract, the Project Engineer should contact the COE and the owning agency as soon as possible for instructions.

5.22.5 Bridges

The Government provides initial control from which the Contractor can locate the bridge. The Contractor determines what additional control is needed for construction purposes and is responsible for staking it. The Contractor is required to submit this staking information to the Project Engineer. The Project Engineer should check its accuracy. Guidance for handling missing or inaccurate control is provided in Section 5.26.3.

If the control is good, the Project Engineer may want to set additional control for checking purposes outside the construction limits. Usually, points set at right angles and even distances are best. The points should be clearly marked, i.e. "offset from bridge chord," "end of bridge," etc. Vertical control should be set close to the bridge to reduce the number of turning points required. Complete level circuits should always be done. Bridge tolerances are much tighter than roadway tolerances, so accuracy is important.

5.22.6 Retaining Walls

This section is written for cast-in-place concrete, cantilever retaining walls. The Project Engineer can apply most of the ideas presented here to other types of walls as well. However, each wall type (cast in place, reinforced earth, gabion, bin wall, keystone block, etc.) has some things unique to it. For an unfamiliar wall type, the Project Engineer may contact the manufacturer to gain insight for laying it out. The Contractor, per the Contract requirements, does actual layout.

Unlike bridges, locations of retaining walls may not be precisely established on the plans. In many situations, the Contract requires the Project Engineer to field check the beginning and ending station of the wall before the Contractor can order materials or begin work.

A common method used to check the Contractor's staking involves setting an offset line parallel to the wall. The inspector measures from this line to check the wall. On walls, setting the radius points is sometimes more practical and useful. Once the footing for a wall is complete, the Contractor often places control on it. This is convenient to use. It is a good idea to check the location of the top of the form. This is to insure the proper batter is being obtained.

The Project Engineer might rely on the Contractor's control after checking its accuracy. However, this is not an independent check.

5.22.7 Slope Stakes

This section assumes that project personnel have some experience with slope staking. If not, the Project Engineer should provide special training. Many survey books give only a brief description of the subject as compared to traversing, running levels, and other aspects of surveying, which are well explained. When explanations are given, they are often of flat country work, not practical for most WFLHD projects. See Exhibit 5.26A for an Example Slope Stake and Reference Stake markings and notes.

The Project Engineer should closely review the printed earthwork listings and the plotted cross-sections for knowledge of the overall earthwork and stakeout required. Close study of plotted cross-section data proves very helpful in understanding the intended template for the road. The Project Engineer should note anything appearing odd, or contrary to the plans or Contract, for later field checking.

The Project Engineer should review the earthwork and staking data with the Contractor and its staking crew before the contractor does any staking. The Project Engineer should discuss write-up and color-coding of slope stakes and their reference stakes, and whether or not the cuts marked on the slope stakes are to ditch grade or shoulder grade. The Project Engineer should ask the Contractor and its staking crew to demonstrate how they will mark the catch and reference stakes. The Contractor also should explain where substantial differences between the data contained in the furnished field notes and actual ground shots being recorded. The Project Engineer should point out that care must be taken to assure measuring is accurate, particularly when staking is done with a hand level, rod and cloth tape. The Contractor must submit accurate and timely staking notes throughout the life of a project. Failure to furnish staking notes on time prevents or delays review of that work, and causes delay to the total operation.

Once the Contractor has started placing slope stakes in the ground, the Project Engineer should look at the staked line to see if it flows smoothly with the terrain. If there is a slope stake out of line, the Project Engineer should check the plans to see if there is a reason for it. An inlet basin for a culvert may cause a station to appear out of line. If there is no apparent reason for the misalignment, the Project Engineer should check the slope stake book and compare it to the writing on the slope stake. The Project Engineer should check data recorded on slope stakes and R.P.'s for legibility, as well as for content.

The Project Engineer's method for review of the Contractor's staking depends on the equipment available. If a theodolite with an electronic distance meter or a total-station is on the job, the Project

Engineer can shoot catches (slope stake positions) in from a control point. These can be compared to slope stakes the contractor has set. Unless something was wrong with the original topographic data, the two should compare closely. The Project Engineer should check the Contractor's stakes to see that they meet the horizontal and vertical tolerances for the Contract.

Sampling is permissible for checking staking. Unless sample size is specified, the Project Engineer may select about 10% of the stakes in any group being tested. The sample selection method must insure all stakes in the group have an equal selection chance. The average error in the sample is taken to represent the mean error in the work being checked. Vertical and horizontal errors are best considered separately.

If the mean error exceeds specification tolerances, or 10% if none are specified, corrective action is warranted. Some time spent at that point to determine why the error is so large will likely be worthwhile. Check both parties equipment, methodology, and conventions such as measuring from and to the center of stakes or hubs. The project staff might work with the Contractor's crew for a time, or observe its work very closely. The COE might be asked to provide or arrange for help if necessary to find problems.

When re-checking a rejected unit of work, one should take a new sample and proceed as above.

5.22.8 Fine Grade Control Stakes

Fine grade control stakes (red tops, blue tops etc.) can initially be checked similarly to checking slope stakes. The eyeball method will usually show any large bust in the staking. The Project Engineer should require complete level circuits, always tying into a benchmark to close the circuit. To meet the horizontal tolerances, the grade control stakes must be set and checked, using a survey instrument of some type. Taping off slope stakes or slope stake reference hubs does not assure the required accuracy. Section 5.26.4 contains additional information on checking grade control stakes. The checking procedures are the same for all fine grading control points. Definition of various grade control stakes by color code is often in the special contract requirements.

In some situations, the grade control stakes have to be fine-tuned by the Project Engineer to get a smooth ride, and/or to ensure proper drainage of the surface. In a very curvilinear alignment, the tangent run outs can get shortchanged. The Project Engineer may have to adjust the designed superelevation to soften dips or humps, but this should only be done through concurrence with the Designer.

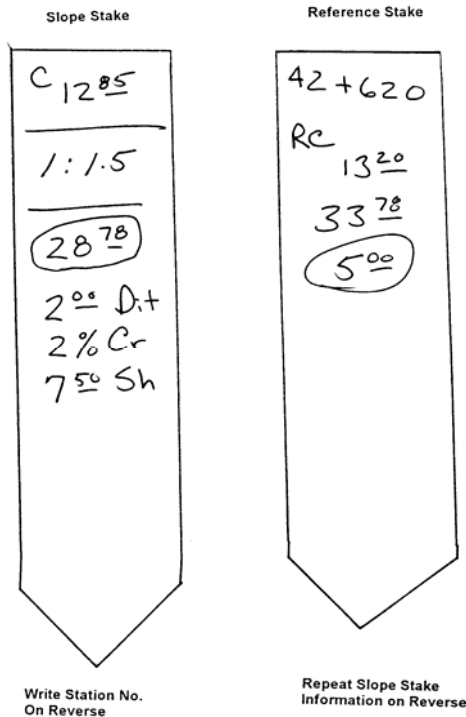
5.22.9 Sight Levels (Swede's) (Exhibit 5.22B)

These are tools with which one person can check the crown, superelevation or linear grade without a level and rod. These are three metal rods each welded to a small base to enable them to stand vertically unsupported. The main rod has a small tee section of tubing welded horizontally to the top that serves as a sight and target. To see if the three levels are all on the same plane, the inspector chooses any random cross-section of the roadway, places a level on the right shoulder, one on the center of the road, and the third on the left shoulder. The inspector then sights from one on either shoulder to the one on the other shoulder. The inspector measures the amount of crown by how far the top of the center level is above the line of sight on centerline. A string line will settle arguments. The levels are usually painted with alternating colored stripes at fixed increments.

To check a roadway section that has a turnout or passing lane, the inspector places one level on centerline and another on the shoulder. Then the third level is placed in between to see that the crown at centerline is carried over the entire length of the template.

The inspector may use this same method of placing three levels across the roadway at a cross-section to check the superelevation by sighting over the top of the handles. This method also works for checking the linear grade of the roadway between stations. The inspector places two levels on consecutive grade hubs, and the third level in between and sights over the top to see if they line up.

The levels give a quick check of uniformity and smoothness of the subgrade, base aggregate course, and later courses. Using levels on vertical curves, horizontal curve transitions and curvilinear alignment will not work as described. The main use of levels is to rough check that the grade is conforming to the template shown in the Contract drawings.



Slope Stake

The intersection of the stake and ground is 12.85 meters above grade of ditch.

The cut slope ratio is 1 unit vertical to 1.5 units horizontal.

The stake is 28.78 meters from centerline. Some conventions show distance to bottom of slope.

(Optional) The template at this station has a 2.00 meters wide ditch. Ditch depth might be shown if it varies.

(Optional) The roadbed is crowned at 2% at this station.

(Optional) The subgrade shoulder break is 7.50 meters from centerline at this station.

Reference Stake

The stake is at Station 42+620

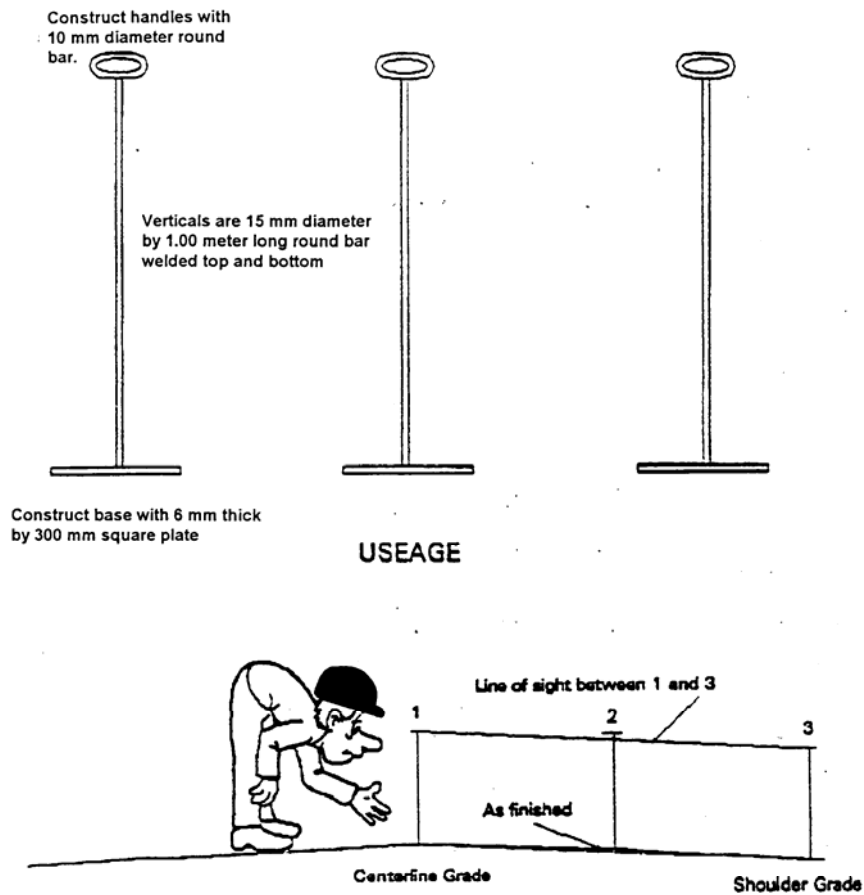
The stake is a reference cut (RC), 13.20 meters above the grade of the ditch.

The stake is 33.78 meters from centerline.

The stake is 5.00 meters horizontally behind the slope stake.

EXAMPLE SLOPE STAKE AND REFERENCE STAKE

Exhibit 5.22A



SIGHT LEVELS

Exhibit 5.22B

5.23 CONSTRUCTION SCHEDULES

FAR Clause 52.236-15, Schedules for Construction Contracts, and Section 155 of the Standard Specifications (FP) require the Contractor to submit a construction schedule. This construction schedule is to represent the sequence in which the Contractor plans to perform the contract work, showing start and end dates for each work activity including material ordering and delivery.

5.23.1 Limitations on Completing Work

The time allowed for completion of a contract is the ultimate limitation or constraint on the construction activities required for the project. Numerous activities can be planned, supplied and constructed within the contract time by recognizing the limitations on the work and the interdependence between activities of work.

Most activities are resource dependent, i.e., they rely on resources such as equipment and labor. Other activities of work are independent and can be carried out simultaneously if sufficient resources are available such as constructing a bridge while earthwork or paving are being completed.

Some activities, however, are completely dependent on the completion of another activity such as the sequence of excavation to embankment construction, then fine-grading, followed by placement of any base courses, and finally the asphalt paving.

Other activities, such as concrete curing or form removal, are restraints since they cannot be completed before a minimum amount of time has elapsed, i.e., seven days is required for curing and a percentage of the 28-day strength must be achieved before the forms can be removed. Other possible restraints are shop drawing approvals, traffic lane closure restrictions, limited work hours and climatic conditions. To properly manage a construction project, all of these activities, constraints, and limitations must be logically organized and developed into a construction schedule.

5.23.2 Construction Schedule Format

The general format for the construction schedule includes a graphic representation of the sequencing of work activities and the time to complete each of these activities, and a written narrative supporting the Contractor's logic in the development of the graphic representation. The FP requires the Contractor to use one of two standard formats, the Bar Chart Method or the Critical Path Method. The Special Contract Requirements (SCR) may limit the choice to only one of these specific formats; otherwise it is the Contractor's option.

1. Bar Chart Method (BCM)

The BCM format consists of a progress bar chart and a written narrative. The FP outlines the information to be included on the bar chart and in the written narrative. The bar chart typically is comprised of a horizontal time scale and a vertical listing of project work activities. Bars are drawn to graphically represent the span of time necessary to accomplish each activity. BCM schedules are usually not allowed on WFLHD projects except for very small short duration ones.

Bar charts are the least sophisticated of scheduling methods because they do not show the relationships and dependencies of different work activities; do not tie the work to resource utilization; do not show float time; and are not effective in determining overall impact (cause-effect) on time resulting from a change or disruption. As such, delay analysis is impossible to perform accurately.

Bar charts are appealing to operations personnel because they identify the general course of the work in an uncomplicated fashion and they are easy to use in routinely monitoring the Contractor's progress.

The narrative requirement for the BCM method of scheduling increases the usefulness of the bar charts. The Contractor is required to identify anticipated resources and production rates. If during construction, the scheduled resources are not used on the project, or if the production rates are not achieved for unchanged work, it is possible to prove the Contractor's original schedule was defective. However, when the Government is responsible for a delay, using the BCM, it remains a difficult, if not impossible, job to evaluate the impact of each delay or inefficiency encountered through the course of the project, and quantify the true delay for which the Government is liable.

2. Critical Path Method (CPM)

The CPM format consists of a diagram, a tabulated schedule, and a written narrative. The FP outlines the information required for each of these submittals. The CPM is the more sophisticated and useful format and will normally be required on complex or larger contracts. It represents the sequence and interdependence of work activities and time, factors in any constraints and restrictions, and clearly defines the critical activities of work. Through this maze of activities, constraints and restrictions, lies a critical path sequence that cannot be altered without affecting the overall completion date.

a. The Critical Path

The critical path is the longest chain of dependent activities. These dependent activities are critical activities, also described as controlling activities of work. The critical path is of obvious importance when considering the impact of a contract modification on the completion date. If a contract modification affects a critical activity, a time extension should be considered. An event that causes a delay to part of the project may not increase the time required to perform the entire project unless it delays a critical activity on the critical path.

b. Float Time

For work activities not on the critical path, the Contractor has some leeway as to when these non-critical work activities are started. This leeway is called float time. Float time is the amount of time an activity can be delayed without affecting the completion date of the contract. Float time can also be defined as the amount of time between the earliest start date and the latest start date, or between the earliest finish date and the latest finish date. When the float time for an activity is exceeded, it becomes a controlling activity of work, moves onto the critical path, and affects the contract completion date. Activities on the critical path have no float time.

c. No Float and Multiple Critical Path CPM's

It is important that the Contractor assign a reasonable amount of time to all work activities and identify any float time in the schedule. With any delay, an activity with little float time can become a controlling activity of work.

A schedule with little float time for most of the work activities often puts the Government at a disadvantage, since any delay will soon affect completion and could result in a delay claim.

CPM's with multiple critical paths should also be closely reviewed, since seldom is there more than one truly critical path. If a schedule with multiple critical paths is accepted, the

Government is at a disadvantage because any delay will probably impact one of the paths. Multiple critical paths are usually created by assuming low production rates and eliminating float on non-critical activities so that the activities appear critical.

If the Government can show that actual production and activity durations were consistently better than those assumed on the original schedule, that evidence can be used to question whether those durations were *realistic*, and whether the activities were therefore *critical*. A new schedule can be requested on this basis. It is best to make such observations prior to a change or differing site condition, which may impact time.

5.23.3 Submittal Requirements and Review

The FP requires that three copies of a preliminary work plan be submitted at least 7 days before the preconstruction conference. The preliminary work plan is a written narrative detailing the Contractor's contract activities for the first 45 calendar days after the NTP is issued.

The preliminary work plan should include the following:

- A title page stating the contract number, project number, project name, Contractor name, current fixed completion date, date of submittal, submittal number, and "*Preliminary Work Plan*"
- Describe work to be done within each activity including the type and quantity of equipment, labor, and materials to be used.
- Describe planned production rates by pay item quantities (e.g. cubic meters of roadway excavation per day)
- Describe the number of work days per week, holidays, numbers of shifts per day, and number of hours per shift. Include all calendars used in the schedule module
- Estimate periods during which an activity is idle or partially idle. Including beginning and end dates.
- Describe expected and critical delivery dates for equipment or material that can affect timely completion of the project
- Identify the Vendor, Supplier, or Subcontractor to perform and activity. State assumptions made in scheduling their work.

The Contractor should not be permitted to start any work, except mobilization and traffic control, i.e., erection of construction signs, until the PWP is approved. Seven calendar days after the preconstruction conference, the preliminary work plan must be accepted or rejected and returned for revisions. If the preliminary work plan is acceptable without reservations, stamp it "Accepted" and return a copy of the stamped page to the Contractor, or send a letter "accepting" the schedule to the Contractor. If the preliminary work plan is not approved, the contractor has three days to resubmit a revised preliminary work plan.

The FP requires that three paper copies and one electronic copy of the initial or "as bid" construction schedule for the total contract work be submitted within 20 calendar days after the NTP is issued. This initial schedule must be accepted, or rejected and returned for revisions within 7 calendar days after receipt by the Government. This initial construction schedule, whether in the BCM or CPM format, is of particular importance. The Contractor's initial construction schedule should show how they plan to begin, sequence, and complete the principal phases of work within the time allotted by the Contract.

It is the Contractor's initial construction schedule that normally warrants the most thorough, in-depth review by the Government. Once accepted, this initial schedule will establish the basis against, which all future schedule changes or updates and claims will be compared and justified. The Government's review should carefully consider each work activity on the schedule and the time proposed for its completion. Any unrealistic production rates based on proposed crew size or number of equipment should be questioned. Any impractical sequencing of work activities either for contractual reasons, e.g., impermissibly staged or phased construction, physical constraints such as assuming access where there

is none, or for improper workmanship or aesthetic, e.g., placing final asphalt surface before construction of adjacent curb, should be questioned. Also, any actions involving the Government such as shop drawing approvals or time allotted for testing should be carefully reviewed. All reservations should be documented in writing and returned for resolution before final acceptance of the schedule. If it is determined that there are no contractual or supportable operational reasons for rejecting an optimistic schedule, all reservations should still be included in the acceptance letter. By accepting an unrealistic schedule from the Contractor, the Government could be at a distinct disadvantage when defending against any future delay or impact claims. If there are no reservations, stamp the initial project schedule "Accepted" and return a copy to the Contractor, or provide a letter stating that the schedule was accepted. If rejected, the Contractor has seven days to resubmit a revised schedule.

The FAR permits the withholding of a portion of the progress payment if the Contractor fails to submit their schedule within the time prescribed. Progress payments should be withheld until receipt and acceptance of the Contractor's initial construction schedule. Progress payments may be withheld, in part, if schedule updates are not submitted as required. Prudent judgment should be used in withholding payment due to disagreements with the Contractor concerning his submitted schedule. Generally, if the required initial schedule has been submitted in good faith, but is not acceptable for clear, objective reasons, or if the approved schedule has proven obsolete and the Contractor has failed to submit a requested update, the maximum ten percent retainage provision contained in *FAR Clause 52.232-5, Payments Under Fixed-Price Construction Contracts* is an appropriate withholding. Minor problems do not normally justify any withholding.

5.23.4 Schedule Updates

FAR Clause 52.236-15 and the FP both require the Contractor to document actual progress on the approved construction schedule. Three paper copies and one electronic copy of an updated construction schedule must be submitted at least every month or when any delay or change occurs as outlined in the FP. The SCR may specify a different submittal frequency.

Construction schedules, especially those in the CPM format, should be updated frequently because any change in production or other events that impact time can make the schedules obsolete, may alter the critical path, and therefore change the controlling activities of work. Schedules reconstructed after the fact can be biased so that the true picture of the past work is not shown.

If the Contractor's progress is not satisfactory – usually defined as when the progress falls 10 percent behind the current schedule – an updated schedule should be requested, in writing. The request should ask the Contractor to identify any Government caused delays. It should also notify the Contractor of any intent to withhold a monetary retention due to unsatisfactory progress, or the assessment of liquidated damages if the Contract time is about to elapse. It is also prudent to request an updated schedule when issuing a major contract modification, time extension, or a directed acceleration.

All updated construction schedules should be reviewed, accepted, or rejected and returned for revisions. The review can focus on the areas of the updated schedule, which have been significantly changed from the previously accepted schedule. The Contractor should identify these changes in the narrative submittal. Any reservations should be documented in the acceptance letter. If there are no reservations, stamp the update "Accepted", and return a copy to the Contractor, or provide a letter stating that the schedule was accepted.

5.23.5 Distribution and Filing of Schedules

The Contractor is required to submit 3 copies of the schedule (preliminary or update). Send one copy to the COE. File one copy in the Project Files. You may mark up the "Project Files" copy during your review. After reviewing the schedule, stamp the third copy "accepted" or "returned for revisions" and send it to Central Files. At the same time, send a letter to the Contractor stating whether the scheduled was accepted or what revisions are necessary.

5.24 REPORT ON PARTIALLY COMPLETED PROJECT

When a project is inactive for the winter or other long period of time, the COE may request a detailed project status report on the project. This should be a memorandum report containing a brief outline of the work done, work remaining, problems outstanding, and suggestions and ideas which might be helpful to a new Project Engineer unfamiliar with the project. Winter maintenance responsibility and anticipated activities might be described in such a report. Agency and Contractor contacts should be identified.

Prior to temporary shutdowns or other discontinuity, it is also a good idea to prepare a status report for all pending contract modifications. This will be a useful reminder of issues that may need to be attended to, such as:

- Complete vs. incomplete work
- Submittals due from Contractor
- Pending negotiations relative to contract time or payment
- Documentation of effects on other work

5.25 FINAL INSPECTION AND COMPLETED PROJECT SURVEY

5.25.1 All Projects Except OMAD

A final inspection is held at the completion of a project. The Project Engineer may issue verbal or written invitations to the contractor, client agency and any other interested parties. The purpose of the final inspection is to review the project to ensure completion of the project in compliance with the contract requirements, and to ensure the satisfaction of the client agency(s). Upon a satisfactory inspection the COE sends the final acceptance letter for the project to the contractor. The COE also sends a final acceptance letter to the cooperators to the Project Agreement (client agency(s) and maintaining agency(s) as appropriate).

The final inspection should be a formality to do the “final check” before the final acceptance letter is written. Prior to this inspection, the Project Engineer should coordinate with the contractor to ensure the project is in compliance with the contract and that all punch list items have been identified and will be completed prior to the final inspection. The Project Engineer should also coordinate with the client agency(s) prior to the final inspection to ensure their acceptance of the project.

After the inspection has been completed, the COE or the Project Engineer asks each Client Agency to fill out a Completed Project Survey. Surveys may be obtained from the Construction Branch Administrative Assistant. To ensure proper credit and timeliness, the Project Engineer should make sure the project is identified and a due date is noted on the cover of the survey. Time may be allowed after the final inspection for filling out the questionnaires or they can be mailed directly to WFLHD, c/o Construction Branch Administrative Assistant. An address label is attached to the survey and postage can be added upon request to the Construction Branch Administrative Assistant.

5.25.2 OMAD Projects

After a road, or a group of roads in an area are completed, the Project Engineer, County, and the Air Force will inspect the road(s). The Air Force then prepares a memo describing the inspection, and notes if the road(s) is acceptable, or if corrective work is required. A copy of this memo is provided to the Project Engineer, who forwards it to the COE. The COE then writes a letter to the contractor indicating that “a, b, c” roads have been accepted.

When all of the roads in a particular county are completed and accepted, the COE should send a letter to the County stating such, along with a Completed Project Survey. When all of the roads in the contract are completed, the COE should send a letter to the Air Force stating such, along with a Completed Project Survey, and should send the final acceptance letter to the contractor.

5.26 CONTRACTOR PERFORMANCE EVALUATION

It is the policy of the Federal Highway Administration; to award work to contractors with a track record of successful past performance or that demonstrate a superior current ability to perform. This section establishes procedures for evaluating construction contractor performance.

5.26.1 Definitions

Contractor Performance System (CPS) is a centralized and automated database containing performance evaluation information on federal government construction contractors. It is maintained by the National Institute of Health (NIH).

Contracting Officer's Technical Representative (COTR) is the on-site Project Engineer or Resident Engineer responsible for administering the contract. The COTR is also the "evaluating official" identified in FAR 36.201.

5.26.2 Ratings

The CPS form provides 6 rating scores ranging from 0 to 5 and a Not Applicable rating. The definitions of these ratings are as follows:

- 0 = Unsatisfactory – Issues jeopardize the achievement of contract requirements, despite use of Agency resources.
- 1 = Poor – Issues require major Agency resources to ensure achievement of contract requirements. This means that issues arise that must be dealt with through repeated correspondence or continuous inspection of all work items to ensure compliance with the contract.
- 2 = Fair – Issues require minor Agency resources to ensure achievement of contract requirements. This means that issues arise that must be dealt with through a limited amount of correspondence or increased inspection frequencies to ensure compliance with the contract.
- 3 = Good – Issues do not impact achievement of contract requirements. This means that any issues that arise can be addressed through normal inspection or project engineer activities.
- 4 = Excellent – There are no issues.
- 5 = Outstanding – The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. (It is expected that this rating will be used in those rare circumstances where contractor performance clearly exceeds the performance levels described as "Excellent".)
- N/A = Not Applicable.

Ratings of 'poor' or 'unsatisfactory' must be justified and supported by documentation. Justification is placed in the Government Comments section and includes a brief but specific description of the basis for the rating and identification of correspondence or documentation relating to that rating. Include all documentation when forwarding contractor evaluation to the COE for review. Second level (Construction Engineer or higher) approval is required prior to submitting 'poor' and 'unsatisfactory' ratings to the CPS.

5.26.3 Criteria

The following section outlines each of the criteria that the CPS uses to evaluate the performance of the construction contractor. These criteria include seven categories that use the 0 to 5 rating system and five categories that only solicit government comments. The seven sections that use the rating system are:

- Quality of Product or Service
- Cost Control
- Timeliness of Performance
- Effectiveness of Management/Business Relations
- Compliance with Labor Standards
- Compliance with Safety Standards
- Overall

The additional five sections that only solicit government comments are subcontracts, contractor key personnel, small business subcontracting plan, small disadvantaged business goals, and customer satisfaction.

5.26.3.1 Quality of Product or Service

Quality of product or service reflects the contractor's management of the quality control program, as well as the work performed. The contractor will be evaluated in each of the following categories:

- Quality of Workmanship
- Adequacy of the CQC Plan
- Implementation of CQC Plan
- Quality of QC Documentation
- Storage of Materials
- Adequacy of Materials
- Adequacy of Submittals
- Adequacy of QC Testing
- Adequacy of As-built plans
- Use of specified materials
- Identification/correction of deficient work

The basic question is: Has a quality product been provided? If not, use the government comments section to specifically describe the deficiency in quality and the shortcomings in the contractor's quality control system responsible for it.

5.26.3.2 Cost Control

The cost control section is not applicable to the firm fixed price contracts that WFLHD administers.

5.26.3.3 Timeliness of Performance

Timeliness of performance includes administrative activities such as submittal management, responses to RFPs, and submitting of schedules, as well as physical construction activities. The contractor will be evaluated in each of the following categories:

- Adequacy of initial progress schedule
- Adherence to approved schedule
- Resolution of Delays
- Submission of Required Documentation
- Completion of Punch List Items
- Submission of Updated & Revised Progress Schedules
- Warranty response

The basic question is: Has the contractor completed the construction activities and the administrative activities in a timely manner? If not, use the government comments section to specifically describe the delays that have occurred and the underlining causes of those delays.

5.26.3.4 Effectiveness of Management/Business Relations

Effectiveness of management/business relations deals with how well the contractor responds to inquiries, technical and administrative issues, and the contractor's overall service. The contractor will be evaluated in each of the following categories:

- Cooperation and Responsiveness
- Management of Resource/Personnel
- Adequacy of site clean-up
- Effectiveness of job-site regulations
- Compliance with laws and regulations
- Professional conduct
- Review/Resolution of Subcontractor issues
- Change order activity (by contractor)
- Adequacy of work force
- O&M Manuals/instructions
- Spare Parts Delivery

There are two basic questions for this category. Did the contractors on-site and home office management personnel exhibiting the capacity to adequately plan, schedule, resource, organize and otherwise manage the work? Did the contractor make a good faith effort to comply with applicable laws and regulations and the established subcontracting plan? Additionally, the following three questions concerning the "Change order activity (by contractor)" must be addressed to evaluate how the contractor conducted themselves during this process. Did the contractor deal fairly and in good faith? Were they responsive? Did they provide innovative or alternative solutions? Use the government comments section to answer the above questions and to specifically describe any areas of ineffectiveness and the consequences this had on the contract.

5.26.3.5 Compliance with Labor Standards

Compliance with labor standards measures how well the contractor complies with all regulations and provisions for the fair treatment of the work force and accurate payroll submissions. The contractor will be evaluated in each of the following categories:

- Correction of Noted Deficiencies
- Payrolls properly completed & submitted
- Compliance with labor laws and regulations with specific attention to the Davis-Bacon Act and EEO requirements

If the contractor does not fulfill any of these categories, use the government comments section to specifically describe instances of non-compliance.

5.26.3.6 Compliance with Safety Standards

Compliance with safety standards determines if the contractor has provided appropriate personnel protective equipment and associated necessary training for the workforce and if they have implemented an effective safety program; which minimizes/mitigates potential accidents. The contractor will be evaluated in each of the following categories:

- Adequacy of safety plan
- Implementation of safety plan
- Correction of noted deficiencies

If the contractor does not fulfill any of these categories, or if the contractor does not take necessary corrective actions when safety deficiencies are noted, use the government comments section to specifically describe instances of non-compliance.

5.26.3.7 Overall

The overall category reflects how well the contractor fulfilled the requirements of the contract as a whole and the level to which the government had to become involved in order to achieve these results. The results in this section should reflect the trends shown in the previous sections. Use the government comments section to relate any important information that has not previously been stated.

5.26.3.8 Subcontracts

The subcontracts category does not use the rating system. The government comments section should contain a list of the type and percentage of major subcontracts.

5.26.3.9 Contractor Key Personnel

The contractor key personnel category does not use the rating system. The government comments section is divided into three sections. The first section is reserved for the contract manager. The second and third section can be used for any other key contractor personnel such as the Project Manager, Superintendent, and QC Manager. When filling out these sections, the first and last name of the person being evaluated must be provided. Information contained in this section should be concise, factual, and based on the manner in which this person impacted the contract.

5.26.3.10 Small Business Subcontracting Plan

The small business subcontracting plan category does not use the rating system. The government comments section should be used to answer the following questions. Did the contractor make a good faith effort to comply with its subcontracting plan? Did the contractor remain consistent with the goals, objectives, reporting, and other aspects of the plan?

5.26.3.11 Small Disadvantaged Business Goals

The small disadvantaged business goals category does not use the rating system. The government comments section should be used to answer the following question. Did the contractor make a good faith effort to comply with its subcontracting plan in regards to the goals and objectives for small disadvantaged business (SDB) participation, monetary targets for SDB participation, and required notifications? This section does not apply if there is NO subcontracting plan.

5.26.3.12 Customer Satisfaction

The customer satisfaction category does not use the rating system. There are two Yes/No questions which inquire as to whether the contractor was committed to customer satisfaction and whether you would recommend the contractor for future work. The government comments section should be used to briefly explain the answers to the questions listed above. It is also recommended that the evaluating official solicit observations and written comments from WFLHD's client agency/customer concerning the contractor's overall performance prior to finalizing the evaluation and that these comments be included in this section.

5.26.4 Procedures

The PE shall evaluate contractor's performance and prepare a performance evaluation using the CPS form, and forward to COE for concurrence, for each construction contract of:

- a) \$100,000 or more;
- b) \$25,000 or more, if any element of performance is either unsatisfactory or outstanding;
- c) \$10,000 or more, if the contract is terminated for default.

The preceding construction contract costs are based on the contract cost at the time of substantial completion or at the time of award, whichever is greater.

An interim performance evaluation shall be prepared for ongoing contracts when a contractor's performance is generally unsatisfactory for any element for a period of 30 days or longer. Interim evaluations should be issued if the contractor's performance is headed toward an overall 'unsatisfactory' or 'poor' rating. The final performance evaluation shall be prepared within 10 days of final acceptance of the work or at the time of contract termination. The Construction Engineer shall approve both interim and final unsatisfactory and poor evaluations. Evaluations of 'fair' or higher are approved by the COE.

Copies of all correspondence regarding a contractor's performance evaluation shall be sent to Central Files along with the evaluation. Evaluations and support documentation shall be distributed as shown in the contractor evaluation process diagrams.

5.26.5 Implementation

5.26.5.1 Initial Notification

The first step in evaluating contractor's performance is to notify the contractor at the preconstruction conference of the performance elements against which their performance will be evaluated. The contractor should be informed as to what constitutes each of the six performance ratings during the life of the contract, and that the performance evaluation will be one of the criteria used to make responsibility determinations on future projects.

In addition, the contractor must be notified that FHWA has changed to a new contractor evaluation system and is now posting contractor performance evaluations in the National Institute of Health's Contractor Performance System. The contractor must also be informed that they have a right to view and comment on the completed evaluation forms. To do this the contractor will need to register online at <https://cpscontractor.nih.gov>. Inform the contractor that they must review the evaluation and submit comments within 30 days of notification by the CPS and that reviewing the evaluation and submitting comments is limited to one entry for each evaluation. The government will then have one more opportunity to comment before the evaluation is closed. A users manual can be found at <https://cps.nih.gov/infopage.asp> by selecting the "CPS Info" button and then the "Contractor's User Manual" link located in the "Contractor Information" column.

The criteria listed in the CPS form are not intended to be all-inclusive, but should provide a point of departure to develop additional questions and responses, which will result in the preparation of a well-documented performance evaluation.

5.26.5.2 Interim Performance Evaluation Process

The PE must be on the alert for indications of unsatisfactory or poor performance and must initiate the interim performance evaluation process when a contractor's performance is unsatisfactory on one or

more elements for a period of 30 days or longer, or when circumstances dictate as noted in the following paragraph. Interim unsatisfactory or poor ratings alert contractors of their shortcomings and serve as a valuable tool in energizing them to improve their performance, correct deficiencies, and avoid a final unsatisfactory or poor rating. The COE should be kept personally aware of the status of the contractor's performance and the PE's intent to recommend an interim unsatisfactory or poor rating. It is mandatory that the contractor be given the opportunity to meet with the Construction Engineer prior to issuance of the interim unsatisfactory or poor rating. The CPS form is used to prepare interim unsatisfactory or poor performance evaluations.

As stated in the preceding paragraph, the normal time frame for initiation of the interim performance evaluation process usually occurs after 30 days of unsatisfactory or poor performance. However, in circumstances involving a critical feature of the work that the contractor must perform at the level of fair or higher and does not, or if the project is of a short duration, the process may begin without waiting for the end of the 30-day evaluation period.

After the issuance of an interim unsatisfactory or poor rating, the PE must continue to monitor the contractor's performance and re-evaluate the contractor's performance.

5.26.5.3 Final Performance Evaluation Process

There are no rigid rules governing the number of items on a performance evaluation, which must be unsatisfactory before an overall unsatisfactory or poor rating is issued. Unsatisfactory performance on one or more of the elements to be rated may be sufficient to justify an overall unsatisfactory rating. If an unsatisfactory rating is contemplated, the COE should be involved in reviewing the supporting documentation. The Construction Engineer and the COE must be satisfied that the justification and documentation supporting an unsatisfactory or poor rating is adequate.

Final unsatisfactory or poor ratings should not be a surprise to the contractor since interim notification of the contractor's deficiencies should be fully documented during the course of the contract, and it is mandatory that the contractor be given the opportunity to meet with the Construction Engineer prior to issuance of the unsatisfactory or poor rating. However, an interim unsatisfactory evaluation is not a prerequisite for issuing a final unsatisfactory or poor rating.

Performance evaluations must be completed for all contracts as specified above, regardless of rating. The final performance evaluation will supersede any previous interim evaluations.

5.26.6 Specific Instructions for Completing CPS form

It is very important to correctly fill out the beginning of the CPS form correctly. The following is a list of all required fields and the proper answers for each field.

- Project Number/Name: Found on front of contract
- Contractor: Found on front of contract
- Host Agency: DOT
- Evaluating Agency: FHWA
- Contracting Office: LANDS
- Contract Number: Found on front of contract (DTFH70-??)
- Order Number: Leave blank
- Reporting Period: Notice to proceed date to actual completion date (not final acceptance date)
- Evaluation Type: Final or Interim
- Termination Type: Terminate for Convenience, Terminate for Default, or None
- Evaluation Form: Construction
- Duns: Dun & Bradstreet number which has been provided by the contractor and is located in the "B" pages of the contract, usually following the Partnering provision.
- Contractor Name: Will automatically fill in after input of Duns.

- Contractor Address: Will automatically fill in after input of Duns.
- NAICS: 237310
- Commodity Code: Leave blank
- Procurement Method: Sealed bid or negotiated
- Contract Type: Fixed Price
- Amount of basic contract: Original bid amount
- Total amount of modifications: Total of all contract modifications
- Liquidated Damages Assessed: Total of all LDs
- Net Amount Paid Contractor: Total amount paid after final completion
- Award Date: Found on front of contract
- Actual Completion date: Date work was completed
- Original Completion date: Firm fixed completion date in contract
- Date work was accepted: Date of the letter from the COE accepting the work

FHWA is now posting evaluations in the National Institutes of Health's Contractor Performance System (CPS) for completed projects. Register at <https://cpscontractor.nih.gov> to view and comment on evaluations. Registration is only required once into the system. A user's manual can be found at <https://cps.nih.gov/infopage.asp> by selecting the "CPS Info" button and then the "Contractor's User Manual" link located in the "Contractor Information" column. Review the evaluation and submit comments within 30 days of notification. Reviewing the evaluation and submitting comments is limited to one entry. If unable to register, call 360.619.7520 for assistance or a copy of the evaluation.

Construction Contract - Contractor Performance Report Input Data			
Project No/Name:			
Contractor:			
Source Selection Information - See Far 2.101 and 3.104			
Host Agency	DOT		
Evaluating Agency	FHWA		
Contracting Office	LANDS		
Contract Number:	DTFH70-?		
Order Number:			
Reporting Period:	From:	To:	(use actual completion date)
Evaluation Type (choose one):	<input type="checkbox"/> Final	<input type="checkbox"/> Addendum	<input type="checkbox"/> Interim If Interim, % complete
Termination Type (choose one):	<input type="checkbox"/> T for D	<input type="checkbox"/> T for C	<input type="checkbox"/> None
Evaluation Form:	Construction		
Duns:	Online - Contractor Name/Address should self-populate after keying in DUNS.		
Contractor Name	See header.		
Contractor Address:			
NAICS:	Highway/street/bridge:	237310	Other:
Commodity Code:	No entry needed for WFL.		
Procurement Method (choose one):	Sealed Bid:	<input type="checkbox"/>	Negotiated: <input type="checkbox"/>
Contract Type (choose one):	Fixed Price:	<input type="checkbox"/>	Other: <input type="checkbox"/> Fixed Price w/economic Price Adjustment: <input type="checkbox"/>
	Other:	<input type="checkbox"/>	If other, list type : Cost-plus fixed-fee: <input type="checkbox"/>
Amount of basic contract:			
Total amount of modifications:	\$	-	
Liquidated Damages Assessed:	\$	-	
Net Amount Paid Contractor:	\$	-	
Award Date:			
Actual Completion date:			
Original Completion date:			
Date work was accepted:			
Requirement Description:	(500 characters max)		
Project Number/Name:	See header. (When online, include info in "Description of requirement")		
Location:	(When online, include info in "Description of requirement")		

Confidential – Source Selection Sensitive Information

CONTRACTOR PERFORMANCE SYSTEM
Exhibit 5.26A

Construction Contract - Contractor Performance Report Input Data								
Project No/Name:								
Contractor:								
Source Selection Information - See Far 2.101 and 3.104								
Quality of Product or Service								
Criteria	N/A=Not Applicable 0=Unsatisfactory 1=Poor 2=Fair 3=Good 4=Excellent 5=Outstanding Unsatisfactory--Nonconformances are jeopardizing the achievement of contract requirements, despite use of Agency resources Poor--Overall compliance requires major Agency resources to ensure achievement of contract requirements Fair--Overall compliance requires minor Agency resources to ensure achievement of contract requirements Good--Overall compliance does not impact achievement of contract requirements Excellent--There are no quality problems Outstanding--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. (It is expected that this rating will be used in those rare circumstances where contractor performance clearly exceeds the performance levels described as "Excellent".)							
Actual Rating		N/A	0	1	2	3	4	5
	Quality of Workmanship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Adequacy of the CQC Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Implementation of CQC Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Quality of QC Documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Storage of Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Adequacy of Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Adequacy of Submittals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Adequacy of QC Testing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Adequacy of As-builts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Use of specified materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Identification/correction of deficient work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government Comments (2000 characters max)								
Cost Control								
Criteria	N/A=Not Applicable 0=Unsatisfactory 1=Poor 2=Fair 3=Good 4=Excellent 5=Outstanding Unsatisfactory--Ability to manage cost issues is jeopardizing performance of contract requirements, despite use of Agency resources Poor--Ability to manage cost issues requires major Agency resources to ensure achievement of contract requirements Fair--Ability to control cost issues requires minor Agency resources to ensure achievement of contract requirements Good--Management of cost issues does not impact achievement of contract requirements Excellent--There are no cost management issues Outstanding--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. (It is expected that this rating will be used in those rare circumstances where contractor performance clearly exceeds the performance levels described as "Excellent".)							
Actual Rating		N/A	0	1	2	3	4	5
	Cost Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government Comments (2000 characters max)	Not applicable, this is a firm fixed price contract.							

Confidential – Source Selection Sensitive Information

CONTRACTOR PERFORMANCE SYSTEM
Exhibit 5.26A Continued

Construction Contract - Contractor Performance Report Input Data								
Project No/Name:								
Contractor:								
Source Selection Information - See Far 2.101 and 3.104								
Timeliness of Performance								
Criteria		N/A=Not Applicable 0=Unsatisfactory 1=Poor 2=Fair 3=Good 4=Excellent 5=Outstanding Unsatisfactory--Delays are jeopardizing the achievement of contract requirements, despite use of Agency resources Poor--Delays require major Agency resources to ensure achievement of contract requirements Fair--delays require minor Agency resources to ensure achievement of contract requirements Good--Delays do not impact achievement of contract requirements Excellent--There are no delays Outstanding--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. It is expected that this rating will be used in those rare circumstances where contractor performance clearly exceeds the performance levels described as "Excellent".)						
Actual Rating		N/A	0	1	2	3	4	5
Adequacy of initial progress schedule		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adherence to approved schedule		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Resolution of Delays		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Submission of Required Documentation		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Completion of Punch List Items		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Submission of Updated & Revised Progress Schedules		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warranty response		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government Comments (2000 characters max)								
Effectiveness of Management/Business Relations								
Criteria		N/A=Not Applicable 0=Unsatisfactory 1=Poor 2=Fair 3=Good 4=Excellent 5=Outstanding Unsatisfactory--Response to inquiries, technical/service/administrative issues is not effective Poor--Response to inquiries, technical/service/administrative issues is marginally effective Fair--Response to inquiries, technical/service/administrative issues is somewhat effective Good--Response to inquiries, technical/service/administrative issues is usually effective Excellent--Response to inquiries, technical/service/administrative issues is effective Outstanding--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. (It is expected that this rating will be used in those rare circumstances where contractor performance clearly exceeds the performance levels described as "Excellent".)						
Actual Rating		N/A	0	1	2	3	4	5
Cooperation & Responsiveness		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Management of Resource/Personnel		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coordination & Control of Subcontractors		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adequacy of site clean-up		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effectiveness of job-site regulations		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compliance with laws & regs		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Professional conduct		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Review/Resolution of Subcontractor issues		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change order activity (by contractor)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adequacy of work force		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
O&M Manuals/instructions		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spare Parts Delivery		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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CONTRACTOR PERFORMANCE SYSTEM
Exhibit 5.26A Continued

Construction Contract - Contractor Performance Report Input Data									
Project No/Name:									
Contractor:									
Source Selection Information - See Far 2.101 and 3.104									
Government Comments (2000 characters max)									
Compliance with Labor Standards									
Criteria	N/A=Not Applicable 0=Unsatisfactory 1=Poor 2=Fair 3=Good 4=Excellent 5=Outstanding Unsatisfactory--Noncompliance is jeopardizing the achievement of contract requirements, despite Agency intervention Poor Overall--compliance requires major Agency intervention to ensure achievement of contract requirements Fair Overall--compliance requires minor Agency intervention to ensure achievement of contract requirements Good Overall--compliance does not impact achievement of contract requirements Excellent--There are no compliance issues Outstanding--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. (It is expected that this rating will be used in those rare circumstances where contractor performance clearly exceeds the performance levels described as "Excellent".)								
	Actual Rating		N/A	0	1	2	3	4	5
	Correction of Noted Deficiencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Payrolls properly completed & submitted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Compliance with labor laws & regs with specific attention to the Davis-Bacon Act & EEO requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government Comments (2000 characters max)									
Compliance with Safety Standards									
Criteria	N/A=Not Applicable 0=Unsatisfactory 1=Poor 2=Fair 3=Good 4=Excellent 5=Outstanding Unsatisfactory--Inadequate safety program/equipment/training is ineffective and jeopardizes the achievement of the contract requirements Poor--Overall compliance requires major Agency resources to ensure corrective action when safety deficiencies are identified Fair--Overall compliance requires minor Agency resources to ensure corrective action when safety deficiencies are identified Good--Safety program/equipment/training and corrective action of safety deficiencies are usually effective Excellent--There are no compliance issues with safety standards Outstanding--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score.(It is expected that this rating will be used in those rare circumstances where contractor performance clearly exceeds the performance levels described as "Excellent".)								
	Actual Rating								

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**CONTRACTOR PERFORMANCE SYSTEM
Exhibit 5.26A Continued**

Construction Contract - Contractor Performance Report Input Data								
Project No/Name:								
Contractor:								
Source Selection Information - See Far 2.101 and 3.104								
Actual Rating		N/A	0	1	2	3	4	5
	Adequacy of safety plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Implementation of safety plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Correction of noted deficiencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government Comments (2000 characters max)								
Overall Rating								
Criteria	N/A=Not Applicable 0=Unsatisfactory 1=Poor 2=Fair 3=Good 4=Excellent 5=Outstanding Unsatisfactory--Nonconformances are jeopardizing the achievement of contract requirements, despite use of Agency resources Poor--Overall compliance requires major Agency resources to ensure achievement of contract requirements Fair--Overall compliance requires minor Agency resources to ensure achievement of contract requirements Good--Overall compliance does not impact achievement of contract requirements Excellent--There are no problems Outstanding--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. (It is expected that this rating will be used in those rare circumstances where contractor performance clearly exceeds the performance levels described as "Excellent".)							
Actual Rating		N/A	0	1	2	3	4	5
	Overall Rating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government Comments (2000 characters max)								

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**CONTRACTOR PERFORMANCE SYSTEM
Exhibit 5.26A Continued**

Construction Contract - Contractor Performance Report Input Data	
Project No/Name:	
Contractor:	
Source Selection Information - See Far 2.101 and 3.104	
Subcontracts	
Are subcontracts involved?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Gov't Comments on subcontracts (2000 characters max)	List type of work & percent of work.
Contractor Key Personnel	
Contractor Manager Government Comments for Contractor Manager (2000 characters max)	(Last, First name REQUIRED)
Contractor Key Person Government Comments for Key Person (2000 characters max)	<input type="checkbox"/> N/A
Contractor Key Person Government Comments for Key Person (2000 characters max)	<input type="checkbox"/> N/A
Small Business Subcontracting Plan	
Did the contractor make a good faith effort to comply with its subcontracting plan consistent with the goals and objectives, reporting and other aspects of the plan?	
Not applicable <input type="checkbox"/> Yes <input type="checkbox"/>	
Gov't Comments (2000 characters max)	
If this is a bundled contract, did the contractor meet the goals and objectives for small business participation?	
Not applicable <input type="checkbox"/> N/A	
Small Disadvantaged Business Goals	
Did the contractor make a good faith effort to comply with it's subcontracting plan consistent with the goals and objectives for small disadvantaged business (SDB) participation, monetary targets for SDB participation, and required notifications? (does not apply if there is NO subcontracting plan)	
Not applicable <input type="checkbox"/> Yes <input type="checkbox"/>	
Gov't Comments (2000 characters max)	

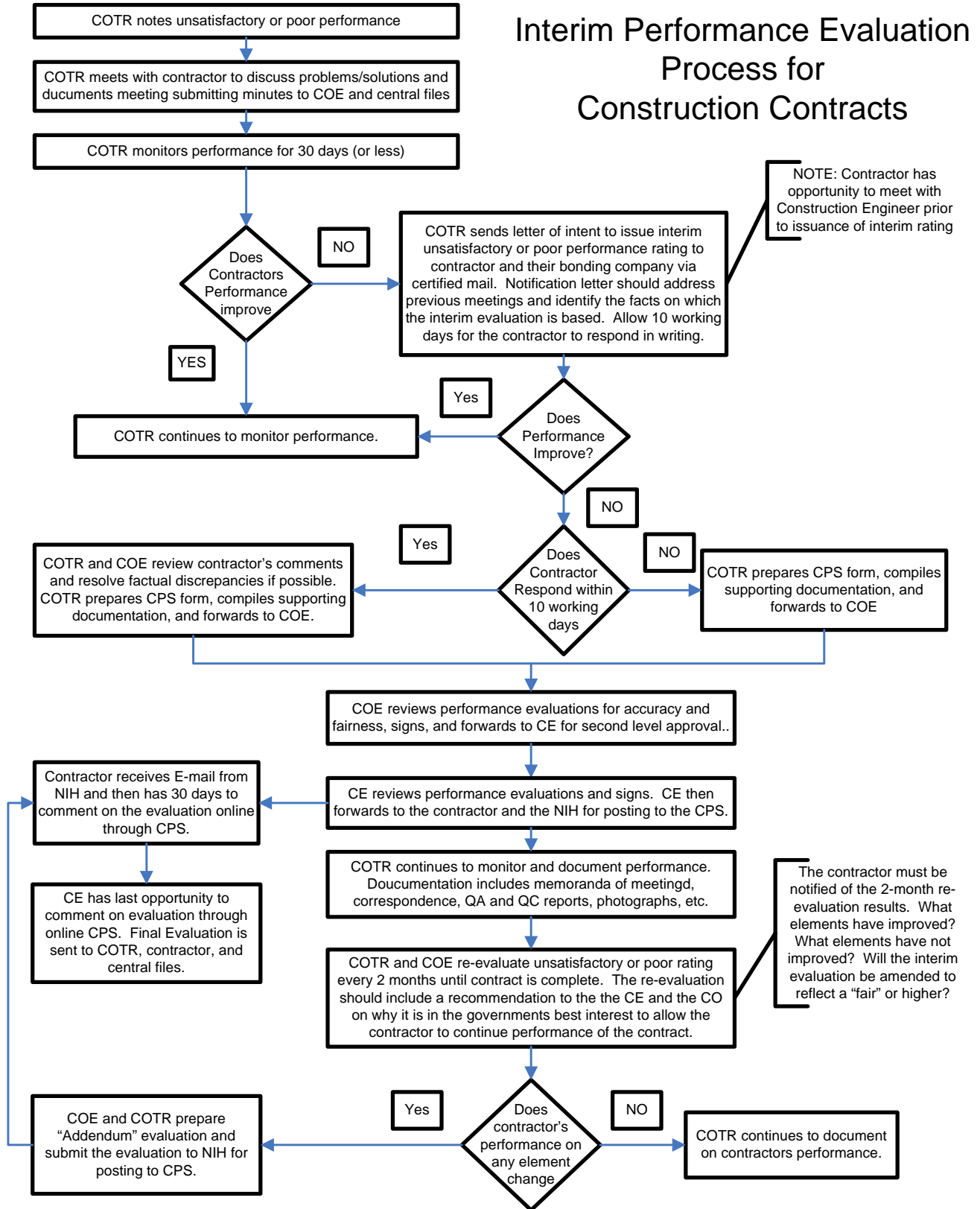
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**CONTRACTOR PERFORMANCE SYSTEM
Exhibit 5.26A Continued**

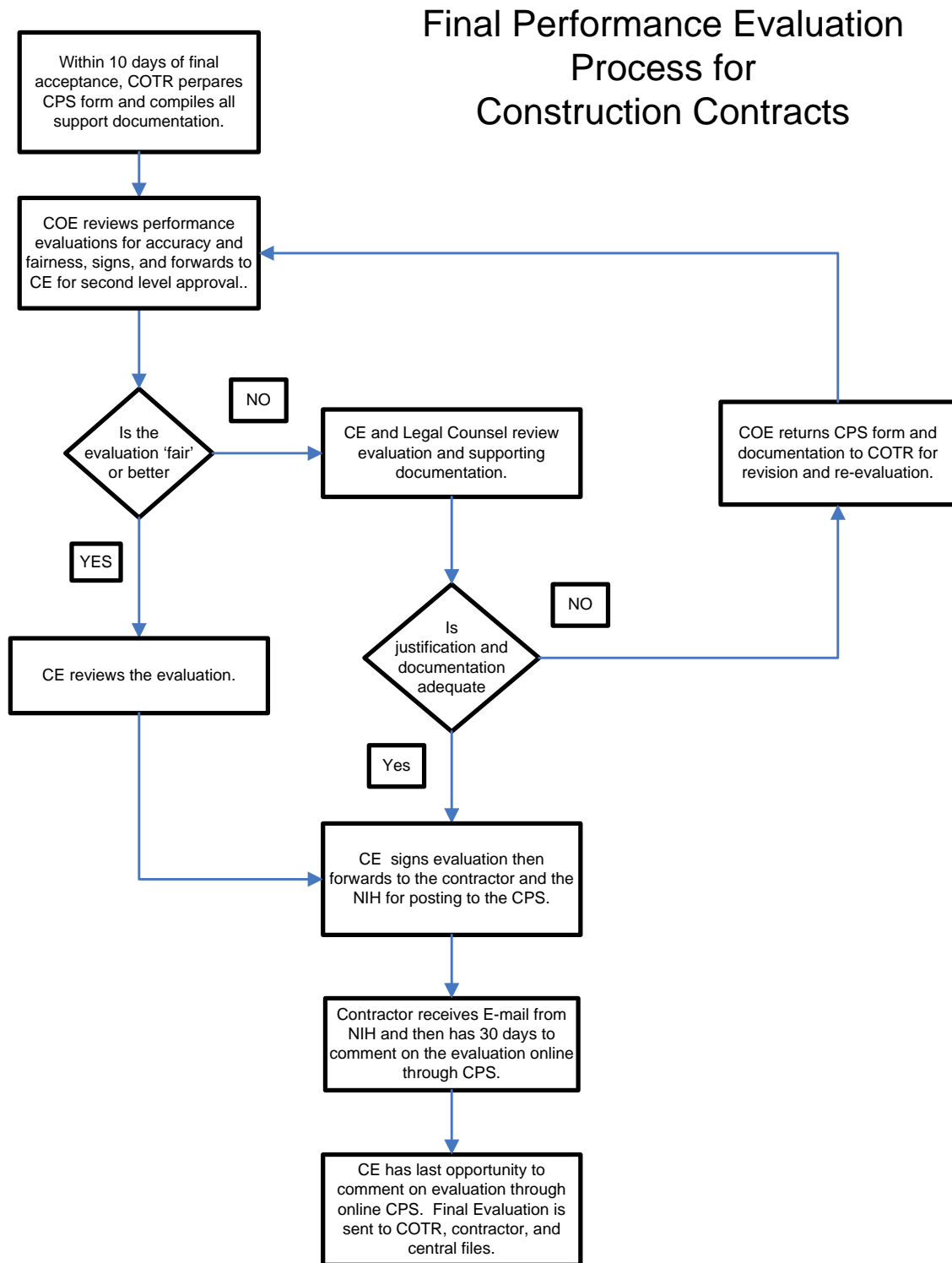
Construction Contract - Contractor Performance Report Input Data			
Project No/Name:			
Contractor:			
Source Selection Information - See Far 2.101 and 3.104			
Customer Satisfaction			
Is/was the contractor committed to customer satisfaction?		Yes	<input type="checkbox"/>
Would you recommend the selection of this firm again?		Yes	<input type="checkbox"/>
No		No	<input type="checkbox"/>
Comments <i>(If "no", include comments.)</i> <i>(2000 characters max)</i>			
Contacts			
The Project Engr/PM info is NOT keyed online.			
Proj Engr (PM):			
Date Completed:			
Project Officer/COTR (COE)			
Title:	Construction Operations Engineer		
Phone (w/extension)			
FAX	360-619-7993		
Email:			
Date Completed:			
Signature:			
Document reviewed by			
Warrented CE or Level III CO			
Date Reviewed:			
Signature:			
Contractor Representative			
Phone (w/extension)			
FAX			
Email:			
Document Keyed into NIH by:			
Date Keyed:			
NIH data reviewed by Level III Contracting Officer prior to submittal of evaluation.			
Date Reviewed:			
Signature:			

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**CONTRACTOR PERFORMANCE SYSTEM
Exhibit 5.26A Continued**



Interim Performance Evaluation Process For Construction Contracts
Exhibit 5.26B



Final Performance Evaluation Process For Construction Contracts
Exhibit 5.26C

5.27 CLAIMS AND DISPUTES

In the course of construction, it is not uncommon for differences of opinion to arise between the Contractor and the Government over interpretation of the Contract provisions, or as to whether increased costs or time extensions are allowable for changes, differing site conditions, or delays. The Contractor may also express dissatisfaction or disagreement with contract modifications.

Most differences can be resolved by negotiation that leads to appropriate contract modifications. Prompt action should be taken to resolve issues and to make any equitable adjustments, giving full consideration to the terms of the Contract.

The Project Engineer must keep the COE informed of issues that arise. The COE will keep the legal office and higher-level Contracting Officers informed as necessary; and will advise the Project Engineer on appropriate actions in the meantime.

5.27.1 Guidance for Preventing Claims

- Remember that the goal is to work collaboratively to get the project constructed.
- Develop a thorough knowledge of plans and specifications.
- Read all relevant portions of the Contract before answering questions or making decisions.
- Perform accurate and consistent timely inspections, testing and reporting.
- Strictly adhere to established testing procedures.
- Accept nothing less, nor require nothing more than required by the Contract.
- Insure that all inspectors are properly instructed to apply consistent standards for the work being performed.
- Maintain professional and cooperative attitude with Contractor personnel.
- Be sympathetic to Contractor's problems, complimentary when Contractor delivers exceptional quality.
- View project accomplishments as a team effort between Contractor and WFLHD personnel.
- Deal with the superintendent or at least the same people on the same issues all the time.
- Try to anticipate and recognize potential claim situations.
- Face problems including WFLHD mistakes, and seek fair and equitable resolutions.
- Track proposed contract modifications to be sure those charged with making decisions know that the project is waiting for those decisions.
- Act promptly and decisively in dealing with problems. If you can't resolve an issue, refer it to someone who can.
- Realize that communication is probably the most effective deterrent to claims – thorough documentation is the best defense.

CHAPTER 6

ENVIRONMENTAL PROTECTION

6.1 INTRODUCTION

One of the highest priorities on any WFLHD construction project is to ensure continuous compliance with environmental requirements. A wrongdoing, no matter how unintentional or seemingly undamaging, can irreversibly harm the environment, result in civil and criminal actions, and can adversely affect WFLHD's ability to get permits and environmental clearances in the future.

The entire construction team is responsible for being mindful of all the environmental facets of the project and foreseeing where difficulties may arise. Close coordination with the Environmental Specialist is essential to a successful project.

6.2 ENVIRONMENTAL CLEARANCE

Environmental clearance requirements for material sources, staging and disposal areas, etc., vary depending on the state in which the project is located, and whether the source or site is Government-provided or contractor-located. The Government will have acquired the permits, clearances, and rights for Government-provided sources, disposal areas, and staging areas. Clearance requirements for contractor-located sources, staging areas, and disposal sites, etc. are listed in Subsection 107.10 of the Contract. In simple terms, the contractor needs clearance in three areas: historic/archaeological, endangered species, and wetlands.

6.2.1 Government-provided Sources

The Government will have acquired the permits and rights to remove materials from Government-provided sources. However, there are two things to keep in mind. First, if during source development or production, archeological remains are discovered, the contractor needs to stop work and the Project Engineer needs to notify the COE. Second, the Contractor must stay within the source's physical boundaries identified in the Contract. Those boundaries might be the limits of what has been cleared environmentally.

6.2.2 Contractor-located Sources

Subsection 107.10 of the Contract identifies the process for obtaining environmental clearance for Contractor-located sources and sites.

Immediately after Contract award, the COE should contact the Contractor to determine their intentions regarding material sources, disposal sites, staging areas, etc. If the Contractor intends to locate their own source(s) or sites, the COE should set up a conference call between the Contractor, Project Engineer, Environmental Specialist, and COE. During this conference call, review the details of Subsection 107.10 with the contractor. The Environmental Specialist should explain the exact process that the contractor will undertake for each clearance. Emphasize the process may take 60 days or more, and encourage the contractor to provide the necessary submittals as soon as possible. (Note: This conference is also a good opportunity to discuss source approval requirements.) The State mining permits usually do not suffice for the archaeological, Endangered Species, and Corps clearances required under Subsection 107.10, and this needs to be stressed with the Contractor. The contractor must hire an archaeologist, biologist, and wetlands specialist for the historic/archaeological, endangered species, and wetlands assessments.

The Project Engineer should perform a cursory review of the submittal. If the submittal clearly doesn't meet the Subsection 107.10 requirements, alert the contractor to the deficiencies, and document them in a letter. If the submittal appears to meet the contract requirements, or if it's fairly close, forward the submittal to the Environmental Specialist. Leave most judgment calls to the Environmental Specialist. They have experience in this area, and might be able to accept a document you might believe is inadequate.

Provide the submittals (archaeological, Endangered Species, and wetlands) to the Environmental Specialist as you receive them. This piecemeal approach will expedite the overall clearance.

As you receive clearances on the submittals, verbally notify the contractor. When all clearances required by Subsection 107.10 are obtained, write a letter to the contractor stating the source or site has received environmental clearance, and they may proceed with source development.

If there are problems with any submittal, immediately notify the contractor verbally and in writing. It is critical not to waste any time with this process, as it could have severe impacts on the project schedule.

6.3 PERMITS

The Government will have acquired all permits necessary to construct the project. The permits are included in Sections H and I of the Contract. Review the permits word-for-word before the project starts and ensure that the Contractor has done the same.

6.3.1 Permits Acquired by the Contractor

Depending on the project, the Contractor may have to acquire a few permits, most commonly for obtaining water and mining.

6.3.2 Deviations to Permits

If a change to any work covered by a permit is contemplated, coordination with the Environmental Specialist is absolute. They will have the background on the original permit application and will understand concerns the permitting agencies may have with the proposed deviation. The Environmental Specialist should do all of the communication with the permitting agency. In rare cases, the Environmental Specialist may suggest that the Project Engineer or COE contact the agency directly, but this is not recommended.

For projects in Alaska, the Alaska DNR needs to review any culvert changes. The Project Engineer usually does this coordination.

6.4 NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS

In accordance with the Clean Water Act, Section 402(p), all construction activities that disturb one or more acres of land require a Storm Water Discharge Permit from the U. S. Environmental Protection Agency (EPA) or a federally-approved state agency. Clearing, grading, excavation, borrow areas, staging areas, and waste areas constitute a disturbance. Within WFLHD's geographical area, EPA is the permitting agency for Alaska, Idaho, and Federally-owned roads in Washington. The EPA is also the permitting agency for Indian Lands in all states. An appropriate state agency is the permitting agency for Montana, Oregon, Wyoming, and county or State-owned roads in Washington.

In many States, inspections by State personnel responsible for administering NPDES are common. These personnel should be treated with respect and cooperation. They will often request to see the permit, the erosion control plan, inspection reports and related documentation. The files on this subject should be kept up to date and easily accessible. A Freedom of Information Act (FOIA) request is not necessary for the inspectors to access WFLHD files. If State inspectors issue instructions or make demands that seem to go beyond the requirements of the Contract and existing permits, discuss the issue with the COE before implementing these actions – especially if the actions may result in unforeseen expenses or liability to the Government.

In many States, monitoring and enforcement by State personnel is active and aggressive. Failure to comply with the requirements of the permit may result in shutdowns, injunctions, lawsuits and other adverse actions against WFLHD and/or the Contractor.

6.4.1 Definitions

National Pollution Discharge Elimination System (NPDES) - The part of the Clean Water Act regulating the discharge of storm water from industrial and construction sites.

Best Management Practices (BMPs) - Temporary and permanent methods of managing sediment and erosion that will prevent erosion, prevent pollutants from the construction materials from mixing with storm water, and trap pollutants before they can be discharged.

Storm Water Pollution Prevention Plan (SWPPP) - A plan designed by the site operators that incorporates BMPs to prevent or control the pollution of storm water before it affects receiving streams.

Operators - For WFLHD purposes, this includes the government, which has the ability to change the specification and the contractor, who maintains day-to-day control of the site activities.

Notice of Intent (NOI) - A form filed with the EPA or appropriate state agency indicating that the operators of the construction site will comply with the terms of the General Permit for Storm Water Discharge from Construction Activities, which EPA published in the September 9, 1992, Federal Register.

Notice of Termination (NOT) - A form filed with the EPA or appropriate state agency that certifies that activities in the SWPPP have ended and:

- 1) Final stabilization is complete and temporary erosion and sediment controls have been removed or,
- 2) All discharges from the construction area have been eliminated or,
- 3) The operator has changed and a new operator is responsible for compliance.

Storm Water - A point source discharge from any discernible, defined conveyance to a water of the United States.

6.4.2 Obtaining the Permit

EPA permits are issued through a self-certification process. The Division Engineer submits a "Notice of Intent" (NOI) to the EPA. In addition to providing information on the location and nature of the activity, the NOI constitutes a certification that WFLHD will comply with the terms and conditions of the General Permit for Storm Water Discharge from Construction Activities which EPA published in the September 9, 1992, Federal Register. The contractor must post the NOI at the construction site.

6.4.3 Basic Terms and Conditions of the General Permit

The basic terms and conditions of the NPDES General Permit are:

1. Preparation of a Storm Water Pollution Prevention Plan (SWPPP) in accordance with Best Management Practices (BMPs) to reduce the amount of sediments in storm water discharges during and after the construction activity. The Plan must include:
 - a. Description of the construction site
 - b. Sequences of disturbance activities (i.e. clearing, grading, culvert installation, etc.)
 - c. Erosion control measures to prevent soil erosion. Such measures must include stabilization practices that minimize the amount of soil disturbance or cover the soil within certain time lines after disturbance, and structural measures, which divert the flow of storm water through the disturbed soils, store the flow, or limit the runoff from the site.
 - d. Sediment control measures which remove the sediment from the storm water before it is discharged from the construction site.
 - e. Management measures to reduce the discharge of pollutants from the roadway after construction.
2. Maintaining the erosion and sediment control measures in effective operating condition.
3. Inspecting the structural control measures and the disturbed areas to ascertain whether the control measures are effectively preventing significant sedimentation in the receiving waters, and if not, revising the plan to prevent the discharge of such sediments.

The permittee is always responsible for making enhancements to the erosion control plan if the construction operations and/or original plan are resulting in unacceptable levels of sediment runoff. However, the Project Engineer should be very wary of eliminating specific features of the original plan even if they appear to be unnecessary. Such actions should be taken only after discussions with the COE and the Environmental Specialist.

6.4.4 State Permits

The procedures for discharging storm water from construction sites differ slightly in Wyoming, Montana and Oregon.

In Wyoming the NOI is sent to the Wyoming Department of Environmental Quality, Water Quality Division in Cheyenne, Wyoming. Wyoming's General Permit for Storm Water discharge is essentially the same as the EPA permit.

In addition to the permit for disturbance of five or more acres, Montana also requires a storm water permit if the disturbance is one or more acres and within 100 feet of a stream. In Montana, the SWPPP must be submitted to the Montana Department of Health and Environmental Sciences (MDHES) at least 30 days prior to the start of construction. The SWPPP must be submitted using a standard form, and must describe the best management practices (BMPs) that the applicant will use during construction to control sediment. Design submits the SWPPP. After contract award, the contractor signs as co-permittee on the general permit form included in the contract and sends it to the Department of Health and Environmental Sciences, Water Quality Bureau. The maintenance and inspection requirements are the same as for the EPA General Permit. Also, Montana requires an application fee and an annual renewal fee for maintaining the permit.

In Oregon, the Department of Environmental Quality issues an NPDES permit which is renewed every five years. This permit does not require the submittal of an NOI for individual projects. This permit is essentially the same as the EPA General Permit except that it prohibits the discharge of any quantities of sediment in excess of 1/2 cubic foot in volume in any area of 100 square feet or less on public or private streets, adjacent property, or into the storm and surface water systems, either by direct deposit, dropping, discharge, or as a result of the action or erosion, and earth slides, mud flows, earth sloughing, or other earth movement which leaves the property. Oregon is the only state that includes such substantive provisions in its permit. The permittee is technically in violation of the permit if it discharges such quantities of sediment or if such earth movements leave the permittee's property.

6.4.5 Administration

The Project Engineer should be familiar with Section 157 of the Contract, the SWPPP, and the permit for the project. The Project Engineer is responsible for ensuring that the contractor performs the work specified in Section 157, the SWPPP, and the Plans. The first order of business is to ensure that the contractor reviews the SWPPP and executes the contractor certification on the last page of the plan. In executing the certification, the contractor certifies that he understands the terms and conditions of the General Permit, that he is a co-permittee with WFLHD to the General Permit, and that as co-permittee, he is obligated to comply with the Plan and the General Permit.

The Montana and Wyoming permits include a page for contractors and subcontractors to fill in at the time of award. The form asks for the contractor/subcontractor name, the designated personnel, and what items of work they are responsible for implementing under the SWPPP.

The Project Engineer should review the Plan with the contractor during the preconstruction conference and have the contractor sign the certification if he has not already done so. In addition, any subcontractor who will implement any erosion control measures identified in the Plan must also sign a certification. A **Sample Certification** is included as **Exhibit 6.4A**.

The Project Engineer must ensure that the erosion and sediment control measures provided for in the SWPPP, Section 157 of the Contract, Plan Sheets and Bid Schedule are furnished, constructed, and maintained in accordance with the terms and conditions of the contract. The SWPPP must be available at the project site and made available to inspectors from the EPA or the appropriate State Agency upon request. The General Permit does not contain specific performance standards. Instead, it relies on the visual inspections to correct any problems with the SWPPP. The EPA does, however, "...anticipate that

Storm Water Management measures at many sites will be able to provide for removal of at least 80 percent of Total Suspended Solids,” at completion of the construction.

The **Montana** permit states that the permittee(s) “...must insure sediment does not reach State waters by using appropriate erosion control practices.”

The **Wyoming** permit states: “You must insure that turbidity will not increase more than 10-15 turbidity units above background levels. Discharge of discolored water could cause a violation.” Wyoming, like the EPA, expects that 80 percent of the total suspended solids will be removed.

The **Oregon** permit states that visible or measurable erosion, which leaves the construction site, is prohibited. One definition of visible or measurable erosion is the deposition of 0.5 cf of sediment per 100 sf or less.

Questions regarding the SWPPP and permit should be directed to the Environmental Specialist.

CONTRACTOR CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the National Pollution Discharge Elimination System (NPDES) permit that authorizes the water discharges associated with construction activity from the construction site identified as part of this certification. Further, by my signature, I understand that I am becoming a co-permittee, along with the owner, to the NPDES permit for storm water discharges associated with construction activity from the identified site. As co-permittee, I understand that I and my company are legally required under the Clean Water Act to ensure compliance with the terms and conditions of the storm water erosion control plan developed under the NPDES permit and the terms of the NPDES permit.

Contractor Signature

Date

SAMPLE NPDES CERTIFICATION

Exhibit 6.4A

6.4.6 Temporary Stabilization

Temporary stabilization measures, such as temporary seeding and mulching or geotextiles, must be initiated within 14 days after construction activity temporarily ceases, unless such activity is scheduled to resume within 21 days of the date the activity ceased. Temporary stabilization measures are included in the contract. If additional items are needed, contact the COE.

If snow cover prevents the initiation of stabilization measures, stabilization measures must be initiated as soon as practicable. In arid regions (average annual rainfall 0 to 10 inches) and semi-arid regions (average annual rainfall 10 to 20 inches) where initiation of stabilization measures is prevented by seasonal arid conditions, stabilization measures must be initiated as soon as practicable.

6.4.7 Inspections

The Project Engineer or their representative, and the contractor's representative must jointly inspect the following:

- erosion and sediment control measures which have been installed,
- disturbed areas that have not been finally stabilized,
- material storage areas that are exposed to precipitation,
- accessible discharge locations or points, and
- locations where vehicles enter or exit the site.

These inspections must be performed at least once a week and within 24 hours of the end of a 0.5 inch or greater storm.

The Project Engineer may rely on weather reports, readings from the nearest Weather Bureau Gauge Station, or local Forest Service gauges for determining when a 0.5 or greater storm has occurred. The Project Engineer may order a rain gauge for the project, but the General Permit does not require this.

The inspection is to determine whether the control measures are effectively preventing the discharge of significant quantities of sediment to the receiving waters. If the control measures are not effective, action must be taken and the SWPPP must be revised within seven calendar days of the inspection to prevent such discharge. Any modifications to the Plan should be included in the SWPPP file. An inspection report must be prepared for each inspection. An NPDES Inspection Report is provided as **Exhibit 6.4B**. The report must include a certification that the facility is in compliance with the SWPPP or identify any incidents of non-compliance. The report must be signed by the government and the contractor's representative and retained with the SWPPP.

For areas that have reached "final stabilization" (see definition below), or during seasonal arid periods in arid and semi-arid regions, inspections shall be conducted once per month.

For **Montana**, the permit requirements for inspection are basically the same as for the EPA General Permit. However, if the SWPPP needs to be revised, MDHES must approve it. A letter describing the changes, a map or drawing of the situation, and the reasons why the changes are needed should be sent to the MDHES-WQB. MDHES-WQB will review the changes and advise as to acceptability. Changes shall not be made until approved by MDHES.

Types of changes that should be submitted to MDHES include deletion of erosion control items, major changes in the type of BMPs being used, or substantial changes to the plan. Addition of silt fence or straw bales, etc., would not need to be submitted. The Project Engineer may call MDHES if in doubt about sending in a modification.

Oregon has an additional requirement that during stormy periods or periods of snow melt when runoff occurs daily, all erosion control facilities shall be inspected daily.

Wyoming requires the same inspection frequency as the EPA, except that 0.5 inches or more of snowmelt is an added inspection. Also, if deficiencies in the pollution control structures are found, they must be corrected immediately. Wyoming requires a different certification statement on the inspection report as shown in **Exhibit 6.4C**.

Final Stabilization as defined by the EPA: "... all soil disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 70 percent of the cover for the unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization (such as the use of riprap, gabions, or geotextiles) have been employed." (70 percent refers to the amount of vegetative cover existing before construction began).

Wyoming defines final stabilization as "slopes and vegetation approximate preconstruction conditions."

For a definition of final stabilization in Montana, see **Exhibit 6.4D**, Montana Vegetation Stabilization Criteria. Note that termination of coverage under the general permit will be at the discretion of MDHES professional staff.

The Project Engineer shall document the existing vegetative cover with photographs or videotape so there is a basis for comparison of vegetation at the time of final stabilization.

6.4.8 Reportable Spills

The General Permit provides that the discharge of hazardous substance or oil from a facility must be eliminated or minimized in accordance with the SWPPP. Where a permitted storm water discharge contains a hazardous substance or oil in an amount equal to or in excess of a reporting quantity established under 40 CFR 110 or 40 CFR 302 during a 24 hour period, the following action is required:

1. The permittee must notify the National Response Center (NRC) at 800-424-8802 in accordance with the requirements of 40 CFR 110 and 40 CFR 302 as soon as he has knowledge of the discharge.
2. The permittee must modify the SWPPP within 14 calendar days of having knowledge of the release to provide:
 - (a) a description of the release,
 - (b) date of the release, and
 - (c) circumstances leading to the release.

In addition, the plan must be reviewed to identify measures to prevent the reoccurrence of such releases and to respond to such releases. The plan must be modified where appropriate.

3. Within 14 calendar days of knowledge of the release, the permittee must submit to the appropriate EPA Regional Office:
 - (a) a written description of the release including the type and estimated quantity of material released,
 - (b) the date of the release,
 - (c) the circumstances leading to the release, and,
 - (d) any steps taken to modify the SWPPP.

These instructions apply only to the discharge of hazardous substance or oil caused by storm water discharge. The Operations Branch maintains a copy of 40 CFR 110 and 40 CFR 302, since it is rather lengthy. The Project Engineer shall notify the COE as soon as he has knowledge of a release. The COE will check the reportable quantity.

The EPA Regional office for Alaska, Idaho and Washington is EPA, Region X, Water Management Division (WD-134), Storm Water Staff, 1200 Sixth Street, Seattle, Washington, 98101.

For the states of Montana, Wyoming, and Oregon, the Project Engineer should check the individual permit for instructions regarding reportable spills.

6.4.9 Notice of Termination

When work has been completed and the site has been finally stabilized, a Notice of Termination (NOT) of coverage under the NPDES General permit for Storm Water Discharge must be prepared, executed by the Division Engineer, and mailed to the EPA or appropriate State Agency. The NOT is essentially a certification that all storm water discharges associated with the construction activity have been eliminated, or that final stabilization has been achieved, or that WFLHD is no longer the operator of the facility. Oregon does not require an NOT.

The Environmental Specialist will prepare the NOT and make arrangements for meeting permit requirements after completion of other work on the project if final stabilization is incomplete. The NOT shall be filed with the SWPPP.

After the NOT has been completed, the Project Engineer shall send the SWPPP including all inspection reports, modifications to the plan, etc., to the Central File where it will be kept for 3 years.

**National Pollution Discharge Elimination System
Storm Water Pollution Prevention Plan
Inspection Report**

Project No. _____
 Project Name _____ Date _____
 Contractor _____

Weekly report _____
 1/2" or greater storm report _____
 Other _____

1. Are erosion control measures identified in the storm water pollution prevention plan such as silt fence, straw bale dikes, diversion channels, etc. functioning properly?
 yes ___ no ___ If no, explain deficiencies and list corrective action to be taken.

2. Is there any off site vehicle tracking of sediment?
 yes ___ no ___ If yes, explain and list corrective action to be taken.

3. Are there any signs of erosion or sediment at the receiving waters associated with the discharge site?
 yes ___ no ___ If yes, explain and list corrective action to be taken.

4. Is there any potential for pollutants to enter the drainage system from material storage areas?
 yes ___ no ___ If yes, list measures to be used to protect the drainage system.

5. Additional comments (optional).

Certification: The above listed construction project is in compliance with the storm water pollution prevention plan and the NPDES permit.

 Contractor's Representative

 WFLHD Representative

NPDES INSPECTION REPORT

Exhibit 6.4B

Wyoming Certification for NPDES Inspection Report

Certification: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

WYOMING CERTIFICATION STATEMENT FOR NPDES INSPECTION REPORTS**Exhibit 6.4C**

MONTANA DEQ WATER QUALITY DIVISION
VEGETATION STABILIZATION CRITERIA FOR STORM WATER

This document shall serve as the basis for determining final stabilization for terminating coverage under the General Discharge Permit for Storm Water Associated with Construction Activity effective September 22, 1994.

Vegetative Cover

The revegetation for final stabilization shall form an effective and permanent vegetative cover which prevents soil movement prior to termination under the general permit. The minimum vegetative cover requirement shall be the amount of cover sufficient to prevent accelerated erosion. Accelerated erosion shall be defined as rills of 2 inches deep or more, earth slides, mud flows, sediment deposition, or evidence of concentrated flows of water over bare soils.

Final revegetation stabilization shall be accomplished using seeding mixtures of forbes, grasses, and shrubs that are adapted to the conditions of the site.

The DEQ staff shall take into consideration final stabilization in relation to the percent cover of vegetation at the site prior to disturbance.

Documentation

Documentation supporting that the site has been adequately stabilized shall be submitted. The documentation required shall include:

1. Pictures of the present revegetative growth at the construction project shall be required. Pictures of the location where each transect was conducted shall be required. Low-level photography shall occur at approximately 90 degrees to the surface in order to properly assess ground cover.
2. A minimum of at least one 100 feet transect of revegetation shall be conducted for every 5 acres that is cleared, graded or excavated. Additional transects may be required by the department on a site-by-site basis. The DHES shall determine the number of transects required for large construction projects (>20 acres). Transects shall be located in an area(s) that is representative of the revegetation for the whole construction project. Transects shall be conducted by laying out a 100 feet tape. At every footmark, note whether vegetation, litter/mulch or bare soil is encountered. Determine the average cover by multiplying the number of points where litter or vegetation is encountered by 100%.
3. Areas in which final stabilization may be less than satisfactory due to poor soil or other natural site conditions, shall document-the percent cover of the indigenous vegetation with pictures and a transect(s).

Termination

Termination of coverage under the general permit will be at the discretion of DEQ professional staff. A contractor may terminate coverage once they have been released from a construction contract by the owner. The owner is responsible for permit coverage and final stabilization once the contractor has been relieved of the contract requirements for a construction project.

MONTANA VEGETATION STABILIZATION CRITERIA

Exhibit 6.4D

6.5 TECHNICAL REFERENCES

Technical references for erosion and sediment control are available from the Hydraulics Team. The available resources include:

- 1) Effective Erosion and Sediment Control on Highway Projects – Dr. Fifield
- 2) NPDES Storm Water Sampling Guidance Document- EPA
- 3) Retention, Detention and Overland Flow for Pollutant Removal from Highway Storm Water Runoff- Interim Guidelines for Management Measures
- 4) Controlling Urban Runoff: A practical Manual for Planning and Designing Urban BMPs- Metro Washington Council of Governments
- 5) A method for Evaluating Erosion Control Plans- Mark Browning
- 6) Virginia DOT Manual of Practice for Planning Storm Water Management
- 7) Storm Water Management for Construction Activities - Developing Pollution Prevention Plans and Best Management Practices- EPA
- 8) Texas DOT- Storm Water Management for Construction Activities
- 9) Test Procedures and Evaluation Criteria for Temporary Erosion Control Blankets, Flexible Channel Lining Material and Cellulose Fiber Mulch Products – Texas DOT
- 10) Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters – EPA
- 11) WSDOT Highway Runoff Manual
- 12) Montana Sediment and Erosion Control Manual – MDHES
- 13) International Erosion Control Assoc. – 1994 Products Directory
- 14) WFLHD Erosion Control Notebook

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CHAPTER 7

SAFETY

7.1 CONSTRUCTION MANAGEMENT TEAM SAFETY

The safety of field employees on the project is the responsibility of the Project Engineer. The Project Engineer shall orient new employees as to the special safety concerns of the project, and shall instruct all personnel by holding frequent safety meetings, and should emphasize those areas of danger that might be encountered on the project.

The Project Engineer should become familiar with regulations regarding operation of vehicles, and with local traffic laws and regulations. They shall see that all personnel required to operate vehicles are properly licensed. The Project Engineer should notify their COE if a WFLHD employee commits serious or repeated safety violations, or who otherwise seems incapable of safely operating vehicles of any kind. Special situations should be discussed with the COE.

The working environment of all WFLHD construction projects is largely under the control of the Contractor. In fact the Contract, FAR Clause 52.236-13, Accident Prevention, specifically requires, among other things, the Contractor to maintain a work environment that will safeguard the health of the public, Government personnel, and its representatives. However, it is the Project Engineer's responsibility to see that the Contractor effectively fulfills this responsibility. WFLHD staff employees cannot be permitted to work in an environment that is unsafe in ways that are correctable or controllable.

7.1.1 Clothing and Footwear

All WFLHD employees' personnel are required to wear hard hats on construction project work sites. This badge of the industry is worn in part to demonstrate emphasis on employee safety, and therefore is not dependent on the relative hazard of operations on any particular occasion.

When working in areas subject to traffic, personnel must wear some distinctive article of protective clothing, such as a bright orange vest or jacket.

Suitable footwear, normally steel-toed, laced boots, is required.

7.2 CONSTRUCTION SITE SAFETY

Federal law requires all WFLHD contracts to contain FAR Clause 52.236-13, Accident Prevention. This clause requires the work to be performed in accordance with the Safety and Health Regulations for Construction (OSHA Part 1926) published by the U. S. Department of Labor. Each Project office should have a copy of these regulations. The clause also obligates the Contractor, without separate or additional payment, to safeguard the public, Government employees, and Government property exposed to the construction. This obligation gives the Government and the Project Engineer the discretion to order correction of hazards whether or not a specific hazard is specifically covered by the OSHA regulations. The following procedures are to be followed to monitor and assure that the contractor's safety program meets the requirements of the contract.

7.2.1 Contractor's Accident Prevention Plan

Consistent with the requirements of FAR Clause 52.235-13, Accident Prevention, all WFLHD contracts require the Contractor to submit an Accident Prevention Plan. Contractors should use Form WFLHD-28, Guide for Contractor's Accident Prevention Plan when preparing their plan.

7.2.2 Weekly Traffic Control Certification

Subsection 156.08(h) of the FP requires the Traffic and Safety Supervisor (TSS) to prepare a weekly certification that inspections and reviews were conducted and that the traffic control devices meet contract requirements. The Project Engineer should review the certification and routinely verify its accuracy through discussions with the TSS and field checks. This is only required on projects where there is a TSS.

7.2.3 Safety Responsibilities Prior to Start of Construction

1. At the Preconstruction Conference, emphasize the Contractor's safety responsibilities under FAR Clause 52.236-13, Section 100 of the FP and Contract provisions dealing with specific subjects such as work zone traffic control and explosives.
2. Accept or otherwise respond to the Contractor's Accident Prevention Plan. If the plan is acceptable as submitted, stamp it "Accepted" and return a stamped copy to the Contractor.
3. Emphasize that the Contractor, not the Project Engineer, is obligated to:
 - a. Perform routine safety inspections and otherwise monitor project safety.
 - b. Immediately correct or otherwise determine an appropriate response to complaints of safety deficiencies whether those complaints come from Contractor employees, the Government or the public.
 - c. Provide the required safety expertise to fulfill these obligations. It should not be assumed that WFLHD or the Construction Management firm have, or will provide, such expertise.
4. Advise the Contractor that the Contract requires that WFLHD notify the Contractor in writing of alleged safety deficiencies, and that the WFLHD will notify the State or Federal OSHA office responsible for construction safety monitoring if deficiencies are chronic or unresolved.

5. Advise the Contractor that if it fails to immediately correct safety deficiencies, especially high risk deficiencies, the Project Engineer is empowered to stop work on the affected operations until the deficiencies are corrected.
6. Advise the Contractor that the safety of public traffic and pedestrians in the vicinity of the project is of paramount concern; and that all accommodation of the public will be in strict accordance with the Contract or subject to the direction and approval of the Project Engineer.
7. Advise the Contractor that inspectors, testers, and other Government employees and other contractors working at the site are not obligated to work under unnecessary or unreasonable risks; and that the inspection and acceptance of the work may require accommodations to protect those personnel.
8. Advise the Contractor that it will be required to provide copies of all accident reports prepared for Government agencies or insurance carriers, to the Project Engineer.

7.2.4 Safety Responsibilities During Construction Operations

1. Project staff are encouraged to perform periodic, unscheduled reviews of the Contractor's traffic control operations. Form WFLHD 404c, Traffic Safety Checklist, - Flagger Operations is useful in conducting these inspections. It is not necessary for the TSS to accompany you during these inspections, but it may be of benefit to them and you.
2. Project staff will not normally perform periodic, comprehensive project safety inspections or safety inspections of Contractor equipment, tools or workplace. However, if during the course of their other duties, project staff become aware of hazardous conditions which result from the Contractor's known or possible violation of either OSHA regulations, or reasonable standards of construction safety practice, as determined by the Project Engineer, the Contractor shall be notified immediately with a written follow up. See Section 7.2.4.1 for an Example Safety Deficiency Notification.
3. Allegations of safety deficiencies may come from sources outside WFLHD and its onsite inspection staff. Client agencies employees, contractor employees, others working at the site, or sometimes just private citizens passing through the site may point out what they think are safety violations. These allegations should be conveyed to the contractor in writing. The contractor shall be instructed to correct the deficiency if the Project Engineer is convinced that there is a deficiency. The contractor shall be asked to investigate the deficiency and take appropriate corrective action if there is doubt as to whether a deficiency exists.
4. All safety deficiencies identified whether serious or minor, singular or repeated, should be considered failures of the Contractor's Accident Prevention Plan, and the Contractor should be advised of the necessity not only to correct the deficiency, but to review and modify the Plan to prevent repeat occurrences.
5. When the Contractor has repeated minor deficiencies or avoidable accidents (more than three in any three month period), any serious or life threatening deficiencies, or any deficiencies which the Contractor failed to immediately correct, a copy of the written notification to the Contractor shall be provided to the State or Federal agency responsible for OSHA enforcement at the Project. See Section 7.4.2.2 for an Example Chronic Safety Deficiencies Notification. The COE should be advised prior to copying the State or Federal OSHA office. This level of safety deficiencies may also be a basis to request that the Division safety resource person assist in an overall inspection and evaluation of the Contractor's safety program. On National Park Service projects, NPS safety specialists may be invited to participate in such evaluations on a consultative basis. Such

an inspection and evaluation would be especially appropriate if the response of the State OSHA office is inadequate to resolve the problem.

6. Once safety specialists have concurred in the Project Engineer's determination of chronic or unresolved deficiencies, appropriate actions under the terms of the Contract, such as issuance of a stop work order, may be warranted. Except for life-threatening situations discussed below, the COE should be advised of, and concur in such actions.
7. When any project staff observes a life-threatening condition resulting from the Contractor's operations, the Contractor shall be ordered to immediately correct the situation. In addition, that portion of the work should be stopped until the hazard is corrected.
8. When in doubt, the Project Engineer may elect to discuss the situation with the COE before taking action. However, it is generally better to err on the conservative side than to not take action when appropriate.
9. Project staff should not directly or indirectly assume control, direction or responsibility for the Contractor's safety. In advising the Contractor of apparent deficiencies, do not prescribe the corrective measures or procedures to be taken by the Contractor. In many cases, you may not know for sure that there is an OSHA violation; for example whether a given piece of equipment is required to have a ROPS (Roll Over Protection System) or other features. Upon notification, it is up to the Contractor to provide the expertise to determine if there is a violation, and to correct it if necessary, or respond to the Project Engineer in some credible manner if there is no deficiency.
10. In addition to its contractual responsibilities, WFLHD has a responsibility to ensure a safe working environment for its employees, other Government employees working in the vicinity and its other contractors. None of these personnel should be required to perform inspection or other duties in an unsafe environment. If the unsafe environment is under the control of the Contractor, advise the superintendent that the work requiring inspection cannot be accepted until the unsafe condition is corrected. For example, rolling operations may have to be suspended during testing if the compaction tester perceives a hazard associated with that equipment. If verbal notice proves ineffective, provide written notice to this effect.

7.2.4.1 Example Safety Deficiency Notification

Include the following information when sending a safety deficiency letter to the contractor.

On May 15, 2007 WFLHD inspectors observed an employee of your testing subcontractor attempting to take a compaction test in the vicinity of Station 11+00. Visibility was poor due to dust from the scrapers. The tester had no safety vest. He was not shielded by a vehicle. Scrapers and other equipment seemed oblivious to his presence as they passed by at speed less than three meters away.

You are directed to review your overall safety plan for adequacy in this area, specifically how pedestrian workers are effectively protected when working in the vicinity of heavy equipment. Please advise the Project Engineer of actions you are taking to minimize this problem and similar situations in the future.

7.2.4.2 Example Chronic Safety Deficiency Notification

Include the following information when sending a safety deficiency letter to the contractor.

This letter summarizes a number of safety problems, which have occurred at the jobsite in the last several months. The frequency and/or seriousness of at least some of the problems suggest that your overall safety program is inadequate; or that to be effective, it should be implemented more assertively.

In March a crane outrigger foundation failed, causing the crane's load to swing and damage some concrete formwork,

Also in March, we advised you of concrete finishers working on planks approximately five meters above the ground, without adequate safety belts.

In May we advised you that you compaction tester was observed working immediately adjacent to compaction and hauling equipment during periods of poor visibility and without adequate isolation of the test site from the construction operations.

On May 26, 2007 several form bolts fell off the top of scaffolding at Pier No. 4 narrowly missing a workman.

You are hereby directed to review your overall safety program and to provide the enhancements necessary to prevent, in the future, these kinds of deficiencies and accidents, any one of which could have resulted in a fatality or serious injury. Please respond to this office in writing by July 1, 2007, detailing the actions you have taken or are taking to enhance your program. If the Government believes your safety program continues to be inadequate, FAR Clause 52.236-13 permits the suspension of all or part of the work pending corrections to the program. We will be compelled to consider such an action if the frequency of accidents and safety deficiencies does not diminish.

7.2.5 High Risk Situations

There are certain high-risk categories of safety hazards, which are statistically of paramount importance and deserve special attention during administration of construction contracts.

7.2.5.1 Construction Vehicle Accidents

This category receives little mention in the OSHA regulations because it is so difficult to write general standards when every situation is different. However, it is a leading cause of construction accidents and fatalities. If you perceive that deficiencies or unnecessary risks are present with respect to the use of construction vehicles, advise the Contractor whether or not a specific OSHA violation has occurred. Some of the deficiencies associated with vehicular accidents are:

- Failure to separate pedestrian workers from heavy equipment and other construction vehicles.
- Failure to provide working backup alarms.
- Failure to adequately plan and manage the movement of vehicles in congested or low visibility conditions.
- Failure to maintain brakes, ROPS and other safety equipment adequately.
- Failure to operate vehicles using due care and caution.
- Altering "as designed" configuration or safety features of equipment.

7.2.5.2 Interaction with Public Traffic

This is an increasingly serious category due to the percentage of highway construction projects being performed under traffic. See Sections 156 and 635 of the Contract, as well as corresponding sections of this manual for additional guidance.

7.2.5.3 Trenching and Excavation

This is a leading cause of construction accidents and fatalities, mostly due to the sudden and unexpected nature of such accidents when required precautions are not taken. In 1989 OSHA substantially revised the safety standards associated with trenching and excavation. See CFR 1926, Subpart P. The actual regulations should be reviewed for exceptions and more detailed information. It is the contractor's obligation to have personnel who are trained in, or otherwise competent to implement the new regulations. Project staff should not be put in the position of providing that competence, training the contractor or approving each trenching operation.

7.2.5.4 Falls

Scaffolding, rails, stairs & ladders meeting OSHA standards are the primary requirement. If that is impractical then safety belts and lifelines are required. If both are impractical then safety nets shall be provided at heights exceeding 7.6 meters. Vertically protruding reinforcing steel below walkways or persons working must be protected.

7.2.5.5 Explosives

Accidents often result from failure to have competent personnel in charge of blasting or failure to develop and follow a valid blasting plan. CFR 1926, Subpart U, and the Contract provisions contain the pertinent requirements.

WFLHD-404C
 (10-81)
 (DOC.#2458C)

Page 1 of 2

U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 WESTERN FEDERAL LANDS HIGHWAY DIVISION

TRAFFIC SAFETY CHECKLIST
FLAGGER OPERATIONS

PROJECT: _____

STATIONS: _____

DATE: _____

WEATHER: _____

REVIEWER (TSS): _____

	<u>O.K.</u>	<u>Needs Correction</u>
1. <u>Are the appropriate number of flaggers being utilized?</u>	_____	_____
2. <u>Are flaggers properly equipped with hardhat (any color); vest, shirt, or jacket of High-Viz color and reflectorized?</u>	_____	_____
3. <u>Are flaggers equipped with required stop/slow sign? (18" or more in diameter)</u>	_____	_____
4. <u>Does the flaggers meet minimum qualifications:</u>		
a. <u>Sense of responsibility for safety of the public and crew?</u>	_____	_____
b. <u>Trained in safe traffic control practices?</u>	_____	_____
c. <u>Average intelligence?</u>	_____	_____
d. <u>Good physical condition, including sight and hearing?</u>	_____	_____
e. <u>Mental alertness and the ability to react in an emergency?</u>	_____	_____
f. <u>Courteous but firm manner?</u>	_____	_____
g. <u>Neat appearance?</u>	_____	_____
5. <u>Are flaggers certified by ATSSA, state agency, or approved organization?</u>	_____	_____
6. <u>Are flaggers checked for quality of operations by contractor on a frequent basis?</u>	_____	_____
7. <u>Do flaggers stop traffic properly?</u>	_____	_____
8. <u>Do flaggers direct traffic to proceed properly?</u>	_____	_____

TRAFFIC SAFETY CHECKLIST – FLAGGER OPERATIONS (Page 1 of 2)

Exhibit 7.1A

WFLHD-404C (10-81) TRAFFIC SAFETY CHECKLIST – FLAGGER OPERATIONS (DOC.#2458C)	Page 2 of 2			
	<table style="width: 100%; border: none;"> <tr> <td style="width: 60%;"></td> <td style="text-align: center;"><u>O.K.</u></td> <td style="text-align: center;"><u>Needs Correction</u></td> </tr> </table>		<u>O.K.</u>	<u>Needs Correction</u>
	<u>O.K.</u>	<u>Needs Correction</u>		
9. Do flaggers alert and slow traffic properly?	_____	_____		
10. Is the <u>flagger</u> stationed the proper distance from the traffic hazard and/or the construction site? (150 meters)	_____	_____		
11. Are the <u>flagger</u> stations highly visible to approaching traffic?	_____	_____		
12. Are the <u>flagger</u> stations adequately protected and preceded by the proper number of warning signs?	_____	_____		
13. Are signs the proper size, shape and color?	_____	_____		
14. Are signs properly spaced?	_____	_____		
15. Are signs unobstructed and clean?	_____	_____		
16. Are signs positioned properly horizontally and vertically from edge of roadway?	_____	_____		
17. Are night operation signing positioned properly horizontally and vertically from edge of roadway?	_____	_____		
18. Are flaggers equipped with two-way radio communication equipment when out of sight from each other?	_____	_____		
19. Roadway condition through work zone?	_____	_____		
<u>REMARKS:</u> _____ _____ _____ _____ _____ _____ _____				
TSS: _____	FHWA Inspector: _____			

TRAFFIC SAFETY CHECKLIST – FLAGGER OPERATIONS (Page 2 of 2)

Exhibit 7.2A (continued)

7.3 ACCIDENT REPORTING AND INVESTIGATIONS

7.3.1 Work Zone Accident Report

All accidents should be reported verbally to the COE the same day of the accident.

Use the Work Zone Accident Report to document any type of accidents occurring within the project limits. Fill in all requested information, use diagrams, etc. Be sure to document traffic control signs and devices in the area, and take several photos.

The local law enforcement agency may be called in to investigate, which they will then do their own report. Ask to get a copy of their report to attach to yours.

The completed report, with any attached law enforcement reports, photos and other documentation, is to be sent to the Project Engineer who will forward it to the COE and the Safety Engineer.

7.3.2 Accident Inquiries and Investigations

Accidents and injuries often result in inquiries from insurance investigators and attorneys. Any subpoenas, depositions and requests for information associated with accidents on the project should immediately be referred to the COE.

WDFD-27
(10/88)
Doc. #0124F:1

WORK ZONE ACCIDENT REPORT

Date: 10/7/96 Time: 1304 Light Conditions: BRIGHT SUN

Project Name & No.: ID PFH 63-1(3) COUNCIL-CUPRUM ROAD

Driver Names (If known): BUZZ LIGHTYEAR
1122 BOOGIE WOOGIE AVE.
TUCSON, AZ 85999

County: ADAMS Weather: CLEAR AND DRY

Location, Milepost, or Station: 63+00 TO 58+00 1 MILE N.W. OF B.O.P.

No. of Vehicles Involved: 1 Severity: Minor damage Major damage

No. of Pedestrians Involved: 0

Surface condition: Wet Dry Injury Death

Adjacent Construction Activity: NONE

Method of Traffic Control: Signs , Temporary Barriers , Flaggers ,
Pilot Car , Other (explain) TEMPORARY PAVEMENT MARKING

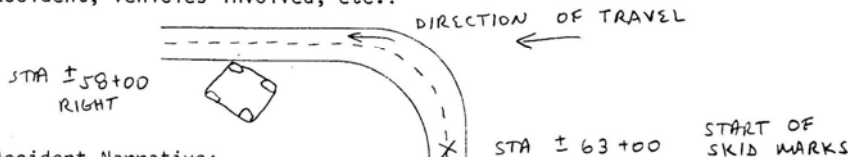
Contributing Factors: Excess speed , Failure to yield , Weather ,
Improper movement , Highway condition , Drugs/Alcohol ,
Mechanical , Unknown , Other

Have other accidents of similar nature occurred in this zone? NO

If yes, give dates: _____

Investigated by: (INSPECTOR) JOE FRIDAY

Accident diagram including all traffic control devices present at the time of accident, vehicles involved, etc.:



Accident Narrative: MR. LIGHTYEAR WAS DRIVING EAST ON COUNCIL CUPRUM HEADING INTO TOWN
WHEN HE LOST CONTROL OF HIS TRUCK COMING AROUND A CURVE. AFTER
TRYING TO CORRECT HE ENDED UP FLIPPING THE TRUCK INTO THE DITCH. FURTHER
INVESTIGATION REVEALED HE WAS UNDER THE INFLUENCE, AND EXCEEDING THE POSTED
Resulting action: SPEED LIMIT.

NONE

Time and date that action was taken: _____

Name and title: Joe Friday, Inspector

WORK ZONE ACCIDENT REPORT

Exhibit 7.3A

7.4 FIRE PREVENTION AND CONTROL

Construction Management staff and the Contractor must comply with the rules and regulations of the Forest Service, Park Service, State, or other public agency having jurisdiction governing fire prevention and control. If they are incorporated into the Contract specifically or by reference, the Project Engineer is responsible for enforcing the rules and regulations governing fire prevention and control, and therefore should obtain copies of manuals of instructions and fire plans of the agency having jurisdiction. Forest Service fire control plans are sometimes included in the special provisions of the contract.

Project staff are required to take appropriate action to suppress unauthorized or accidental fires on public lands; and they shall immediately report fires to the nearest responsible official. WFLHD and/or contractors may also be called upon by officials to help in suppressing fires regardless of the fire's origin or location. In such instances, assistance should be given promptly by all willing, able-bodied employees, and should continue until other forces are available.

If WFLHD employees are called upon to help extinguish fires, the Project Engineer should immediately forward this information to the COE, giving the names of the project personnel involved in fire fighting and other pertinent information. The COE should be asked for instructions regarding payment by other agencies for labor and other costs incurred.

Fire prevention is an item that should be discussed at the preconstruction conference. If Forest or Park officials are not present at the conference, the Project Engineer should arrange a meeting with them and the Contractor to discuss the subject.

The specifications impose a very strict obligation on the Contractor for any fires in the vicinity of the project caused by Contractor personnel. The Project Engineer should direct the attention of the Contractor to the contract requirements before work on the contract starts, and again when permitted burning operations begin.

When burning is permitted, the Project Engineer should determine that the Contractor has secured written permission from the Forest Service, National Park Service, or the local fire control authority, or any other agency having jurisdiction over the area. The special provisions may require the Contractor to furnish a fireguard, either as a subsidiary obligation or with the method of payment specified. When a fireguard is not required by the special provisions but is requested by the agency having jurisdiction over the area because of special conditions, the Project Engineer must take appropriate action to provide such a guard. The Contractor may be ordered to furnish a fireguard by contract modification if necessary and not provided in the contract.

The specifications usually provide that the Contractor, when requested by the Federal agency having local authority, make its forces temporarily available for fighting fires that occur in the vicinity of the project but are not caused by the Contractor. Although payment for such services is the obligation of the requesting agency, the Project Engineer should make appropriate entries in the project diary concerning the fire and the extent of the services provided by the Contractor.

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CHAPTER 8

MATERIALS and ACCEPTANCE OF WORK

8.1 OVERVIEW

Materials incorporated into highway work are of three basic types:

- Off-the-shelf commercial items which are represented by the manufacturer as meeting a standard or industry specification, e.g. guardrail, traffic paint, culvert pipe.
- Commercial items manufactured specifically to meet the requirements of FLH, or which are of sufficient criticality to require inspection and quality assurance by WFLHD or an organization engaged by WFLHD, e.g. structural steel, precast structural elements. Specialists engaged by WFLHD will generally conduct testing and inspection of commercial items, other than off-the-shelf items, at the site of manufacture. State Department of Transportation (DOT) personnel will often be engaged to perform these quality assurance functions.
- Items manufactured at or near the site of work by the Contractor, subcontractor, or supplier, and which are subject to routine inspection and quality assurance procedures by FLH, e.g. asphalt concrete and aggregate base course. The Contractor will perform tests for locally produced materials in accordance with the requirements of the Contract. FHWA will perform verification testing at the WFLHD Materials Laboratory in Vancouver, Washington.

This chapter provides guidance for source approval, sampling and testing, and acceptance of materials produced at the project. It also provides guidance for accepting commercially produced or manufactured items.

Specific requirements for all materials are stated in the Standard Specifications, Special Contract Requirements and Plans. The FLH Field Materials Manual is the primary guide for sampling and testing materials.

8.2 SOURCE APPROVAL

Before the contractor may begin production at a source, WFLHD must approve the source. This approval is based on the material in the source meeting the contract requirements for the particular item being produced (i.e., base aggregate, riprap, etc.).

8.2.1 Government-provided Sources

When a source is government-provided, the Project Engineer can assume that it has been tested and that material within the source, with proper selection and sufficient processing, will meet the quality requirements for source approval. No further source approval sampling or testing is required. Source approval is not required for Government-provided sources. While the contractor is responsible for producing an aggregate material that meets the manufactured product requirements listed in the contract by appropriate crushing, screening, and even reasonable wastage, the contractor is not responsible for quality aggregate properties processing cannot change, such characteristics as soundness, durability, weathering, abrasion, or stripping resistance of the aggregate, nor the quantity of material in the deposit. Therefore, the Government assumes these responsibilities when proposing sources.

If the contractor attempts, using reasonable and accepted industry processing practices, to produce specification material from a Government-provided source, and is unable to do so, the contractor may be eligible for a equitable adjustment for increased costs incurred in producing material from a new source. This additional compensation may include the costs of equipment moves and setup, additional haul, and additional costs of producing the material. This adjustment would be handled through a contract modification. The Project Engineer, Construction Operations Engineer, and appropriate specialists should evaluate the situation and agree that the Government-provided source is not acceptable.

8.2.2 Contractor- located Sources

Sampling and testing for source approval is critical, as it may alert the Government and the contractor to potential problems with the material source. Correcting these problems or moving to another source at this point in the project may save the contractor money, time, and impacts in the long run.

The Project Engineer should contact the Materials Engineer or the Materials Lab Chief with any questions regarding sampling, testing, shipping, or source approval. A phone call early on can quickly resolve problems in the field, and may prevent the need for shipping and testing of additional samples.

8.2.3 Source Approval Requirements

Source approval requirements are listed in the Contract, in the tables at the end of any particular section. Review these tables to determine the sampling and testing requirements for source approval. For example, Table 301-1 provides the sampling and testing requirements for untreated aggregate courses and it lists the characteristics that will be used to determine aggregate source quality.

Follow the sampling and shipping procedures outlined in Section 7.5.

The contractor should their source approval test results to the Project Engineer. If all test results indicate the source meets the contract requirements on all characteristics, notify the contractor in writing that the source is acceptable for the particular product(s). If any Contractor or Government tests fail to meet contract requirements, the source probably is not acceptable. Before notifying the contractor,

collaboratively determine the appropriate action to be taken with the COE and the Materials Engineer. Once a course of action is identified, notify the contractor in person and in writing.

8.3 MATERIAL PRODUCTION

Production sampling and testing requirements are in the table at the end of each section ordering the work (i.e., Section 301, Section 401, etc.). Review these tables to determine what sampling and testing is required during production of the intended item(s).

8.3.1 Number of Samples to Submit for Verification Testing

As the contractor is producing material, obtain the Government's split of all samples taken by the contractor. Forward the first three split samples to Vancouver for verification testing. Compare these results to the Contractor's results to verify the quality control process. If the Contractor's results are verified, submit 10% (at random) of the remaining samples. Obtain all of the split samples, but hold the other 90% at the project office until all of that particular material has been placed on the project and you have discussed material disposition with the COE.

Additional consideration for the test results need to be given to determine compliance with contract specifications. Since gradation target values would not be established at this point, the test results should indicate consistent production that is within the broadband specification limits. Consult with the COE to discuss all quality control test results.

If the test results indicate even the smallest of problems, forward all samples to Vancouver for testing until you and the COE are confident that problems are corrected and that acceptable material is being produced. Alert the contractor to the problems and obtain assistance from the Materials Engineer.

8.3.2 Material Not Meeting Contract Requirements

If the test results indicate that the material does not meet the requirements for one or more characteristics, it may be necessary to issue a stop work order for material production. The contractor may want to continue at their own risk. Every situation and project is different, but it is suggested that you do not allow the contractor to proceed with production. If you do, it could result in 40,000 tons of unacceptable material instead of 1,000 tons. Also, allowing the contractor to proceed doesn't solve the problem. It only pushes the issue to a later, and more costly, point in the project.

The stop work order is a serious action, and it must be discussed with the COE and a Construction Engineer before issuance.

8.3.3 Pay Factor Projections

Enter the production test results into the QL-Pay program. This will enable you to project the pay factor. For most items, you can reasonably predict the pay factor if the material is handled properly and segregation is minimized. For items such as paving aggregates, which usually have multiple stockpiles, it becomes difficult to predict the pay factor because the blend ratios usually won't be established until crushing is completed.

In both cases, you can also compare the results of the Vancouver Materials Lab with the contractor's results. This will help you find testing procedural problems that the contractor may be having.

8.4 MATERIAL STORAGE

The contractor is responsible for the handling and storage of materials to ensure the preservation of their quality and fitness for the work. In cases where the Project Engineer believes the contractor's handling and storage of materials may be detrimental to the quality of the material, the Project Engineer should discuss the issues with the contractor. If suggestions to the contractor about the handling of the materials are not accepted, the Project Engineer should consult with the COE. The Government always has the right to retest materials to verify they have not been compromised by contract operations or the lack of adequate protection. The Government can decline to make advance payment for materials that are not properly stored and protected from contamination.

8.5 SAMPLING AND TESTING

8.5.1 Collecting Samples

Prior to obtaining samples, review the acceptability requirements of containers (quality, size, type) with the contractor. Test results, and ultimately the pay factor, can be directly affected by the manner in which a sample is shipped.

Sample sizes for the various tests are listed in Exhibit 8.5A. Codes for the various tests are listed on the back of the transmittal form, as shown in the FLH Field Materials Manual. Note that these sample sizes are for one series of tests. The contractor will need to double the sample size when collecting for themselves and the Government. Contact the Materials Lab if you have any questions regarding sample sizes.

Detailed information on selecting samples is provided in Section 3.20 of the FLH Field Materials Manual. When the contractor collects their sample for testing by their laboratory, be sure that a WFLHD representative is present to observe the contractor collecting and splitting to obtain the Government's portion of the sample. This is especially important for source approval.

Masses (weights) listed below are minimum amounts required by WFLHD lab to run tests. One canvas bag holds approximately 23kg (50 pounds). DEFINITION OF NOMINAL: For processed aggregate, the nominal maximum size of particles is the largest sieve size listed in the applicable specification, upon which any material is permitted to be retained. (AASHTO T 2).

TEST ON SUBBASE, BASE, & SURFACING AGGREGATES				TESTS ON SOILS	
				kgs	lbs
AG-PG Complete Preliminary Testing of Gravel				SO-PS Complete Preliminary Testing Soils 40(3) 90(3)	
AG-1 to 10, 12 & 13	Subbase "A":	180	400	SO-1 to 5	
	Subbase "B," or			SO-RI Routine Identification (classification) of soils 55 25	
	Base "C," "D," or "E":	160	350	SO-1&2	
AG-PQ Complete Preliminary Testing of Quarry					
AG-4 to 10, 12 & 13	Subbase "A":	160	350	SO-2 Plasticity Index AASHTO T 89/90 12(2) 5(2)	
	Subbase "B," or			SO-3 Specific Gravity AASHTO T 100 12(2) 5(2)	
	Base "C," "D," or "E":	140	300	SO-4 R-Value, 300 PSI Exudation 90(3) 40(3)	
				AASHTO T 190	
AG-EV Base or Subbase Evaluation					
AG-1 to 6 & 16	Subbase "A":	90	200	SO-7 Natural Moisture Content AASHTO T 265 5 2	
	Subbase "B" or			SO-8 Moisture Density, AASHTO T 99 90(3) 40(3)	
	Base "C," "D," or "E":	70	150	SO-9 Moisture Density, AASHTO T 180 90(3) 40(3)	
AG-1 Sieve Analysis AASHTO T 11/T 27				SO-21 California Bearing Ratio AASHTO T 193 90 40	
	Subbase "A":	45*	100*	SO-22 pH of Soil AASHTO T 289 12(2) 5(2)	
	Subbase "B" or				
	Base "C," "D," or "E":	23*	50*	SO-24 Direct Shear AASHTO T 236 12(2) 5(2)	
				SO-25 Resistivity AASHTO T 288 12(2) 5(2)	
AG-10 Immersion Compression AASHTO T 165		80	180	SO-26 Revegetation Analysis 4 2	
				soil with no large rocks	
AG-16 R-Value, 300 PSI exudation AASHTO T 190 19mm nominal size:					
				50 110	
				75 mm	
nominal size:					
		75	160	SO-27 Conductivity of water 1 quart	
				In a plastic jug	
AG-17 Humphre's Granular Compaction		180	400		

(NOTE: The FP calls for 150kg but 180kg is preferable.)				
* This is sufficient quantity to process the entire test group AG-1 thru AG-4				
TESTS ON CONCRETE AGGREGATES AND CONCRETE			TESTS ON BITUMINOUS MATERIALS	
			lbs	kgs
			AC-MD Hot Mix Design, consult with laboratory 800	363
		kgs lbs	AC-IC Preliminary Immersion Compression/CKE T 270 180	80
			AB-CC Complete Classification of liquid asphalt quart metal can	1
CO-1 Sieve Analysis	AASHTO T 11/T 27	15(1) 34(1)	AB-VG Verification of liquid asphalt grading quart metal can	1
			AB-RI Routine Identification of liquid asphalt quart metal can	1
			AB-EA Tests on emulsified asphalt gallon plastic jug	1
CO-11 Compressive Strength (28-day break)	AASHTO T 22	2 cylinders		
			AC-2 Bulk SG & air voids AASHTO T 166 diameter core	6"
			AC-5 & AC-3 Asphalt Content & gradation (T 30) 9	4
			AC-6 Resilient Modulus diameter core	4"
(1) Sample size may vary depending on maximum nominal size as follows:				
			kgs	
lbs				
85% - 4.75 mm and 5% + 2.36mm		0.5		
2				
9.5mm to 50.0 (nom. max. size)		50		
110				
For material with nominal sizes larger than 50mm call the Materials Lab				
(2) Minimum amount of minus 4.75mm (#4) material that must be contained in the sample material being submitted. If the sample contains other size material, enough representative material must be sent so that sufficient minus 4.75mm material is obtained after sieving.				
(3) Sample size may vary depending on maximum nominal size as follows:				
			lbs	kgs
			19.0mm nominal maximum size	40
			90	
			75.0mm nominal maximum size	50
			110	

WFLHD SAMPLE SIZE GUIDANCE

Exhibit 8.5A

8.5.2 Shipping Containers

The type of shipping container to use will depend on the material being shipped. The contractor is required to supply all sampling and shipping containers.

8.5.2.1 Bagged Samples of Aggregate or Soils

Use new, clean, dry canvas sacks for these samples. Bags showing signs of mildew or dry rot are likely to fail during shipping or handling. Put a plastic liner bag (garbage bag) inside these sacks to prevent the loss of fines, especially with high-moisture samples. The woven poly sacks are not acceptable because they tear easily in transit and leak material, which voids the sample. The sack should be closed with a wire tie in addition to the sewn-on tie. Plastic 5-gallon buckets with tightly sealed lids are also appropriate shipping containers for aggregates or soils.

8.5.2.2 Cement, Lime, Or Fly-Ash

Use water-tight containers of any kind that can be shipped.

8.5.2.3 Asphalt Binders or Cutback Asphalts

Use one-liter (one-quart) metal cans, with friction type lids or screw-on caps. The containers must be metal to allow reheating of the sample at the Lab. A can filled three-quarters full contains sufficient material to test. Several cans can be packed in a box for shipping to the Lab.

On asphalt samples being sent to the Lab for mix-design verification, be sure the contractor tells the supplier to send the asphalt in metal quart or one-gallon cans. Do not send any containers larger than a one-gallon size.

8.5.2.4 Emulsified Asphalt

Containers must be plastic. Wide-mouth plastic jars are the best; a plastic milk jug type container is also acceptable. Metal containers are not allowed because they chemically alter the emulsified asphalt and affect the test results. If shipping the sample to the Lab, tape the lid on to prevent spilling, and pack in boxes. Whichever shipping or delivery methods are used, the sample must not be allowed to freeze, and should be sent for testing within one week after it was taken.

8.5.2.5 Hot Asphalt Concrete

Two eight-inch (cubic measurement each side) boxes, filled two-thirds full, is the ideal sample size and container for this material. Please do not send more material than this.

8.5.2.6 Asphalt Pavement Cores

Ideally, pack the cores in six-inch diameter concrete cylinder molds. They need to be well packed to prevent damage during transit. Place the flat surfaces 'back-to-back' to prevent deformation. Newspaper works well for padding. If sand or styrofoam peanuts are used as packing material, wrap the cores in newspaper or plastic first so they don't become contaminated with the padding material. After the cylinder mold is packed with the cores, then pack it in a cushioned box for shipping.

8.5.2.7 Concrete Cylinders

The best method is a wooden box built by the contractor, designed to hold two cylinders in their molds. It should be lined with styrofoam insulation to maintain the appropriate temperature range and provide sufficient padding to prevent damage to the cylinders. These boxes can be sent back to the project for reuse, on request.

Cylinders demand special attention. Because the contractor is given the responsibility of shipping these samples, often they arrive in Vancouver with little or no identification or documentation. If the tags that were inserted into the cylinder have become lost or unreadable, project information and identification needs to be provided on the mold itself. If the cylinder has been removed from the mold prior to shipping, a waterproof marker (such as a 'Meanstreak' marker) can be used.

Because of the way cylinders are processed in the Lab, every cylinder must have its own transmittal. This is true even if several cylinders are from the same batch.

8.5.3 Sample Transmittal Form

Every sample must have a completed Form FHWA 1600W, Request for Laboratory Tests. It is in everyone's best interest to fill out this transmittal completely, as samples arriving in Vancouver with incomplete transmittals can result in delayed test results.

Make three copies of the transmittal. You will need two envelopes.

Put one copy of the transmittal, in an envelope, inside of the sample shipping container, whether it is a box or a canvas sack. If the sample material contains any moisture, you will need to put the transmittal inside a plastic baggie. Even moisture contents as low as 2% can make a transmittal unreadable.

Mail, fax, or e-mail a copy of the transmittal directly to the Lab. This alerts the Lab that the sample is coming.

Attach the third transmittal copy, inside an envelope, to the outside of the container or stapled to the shipping tag. Remember, each sample needs its own transmittal.

Keep the original transmittal for the project files.

8.5.4 Shipping Container Labeling

Have the contractor label the shipping containers with project information. For example:

Project Name:	Minuteman Missile Base Roads		
Project Number:	MT OMAD 18(38)		
Pay Item No.:	Item 30101		
Pay Item Description:	Aggregate Surface Course, Grading C		
Sample No.	CVS-30101-1		
Date and Location of Sample:	7/1/05	Road J-3, Station 4+00, Lt.	

8.5.5 Shipping Address

The contractor should mail all samples to:

ATTN: Materials Lab
FHWA
610 East Fifth Street
Vancouver, WA 98661

8.6 ACCEPTANCE

There are four methods of acceptance -- certification, visual, measured and tested, and statistical. The four acceptance methods are defined in detail in Subsections 106.02 through 106.05 of the Contract. The "Acceptance" subsection of the section ordering the work (i.e., 301, 401, etc.) will identify the acceptance method(s) for the particular items of work under that section.

With respect to acceptance, construction materials will fall into one of the following categories:

- Those found to exceed minimum specification requirements and are accepted at a pay factor exceeding 1.00 as per a statistically based acceptance plan in the Contract.
- Those found to be in reasonably close conformance with the specifications and are therefore accepted at full payment.
- Those not in reasonably close conformance but deemed technically serviceable and therefore accepted at reduced payment as provided by a contract acceptance plan or as mutually agreed if there is no acceptance plan.
- Those not in reasonably close conformance, and not deemed technically serviceable, which are therefore rejected and required to be removed, replaced, or acceptably corrected.

8.6.1 Determining Acceptance

8.6.1.1 Visual

Accept or reject the material based on visual inspection for compliance with the contract and prevailing industry standards. Use engineering judgment to determine if the material is satisfactory. Document that a WFLHD inspector has visually verified the material has no defects and meets the contract requirements. File all documentation in the back portion of the pay item tab in the Pay Item book.

This check should be performed as soon as possible. If the material can be checked before it is incorporated into the work, do so. If it is only possible to check the material after placement, do so as soon as practicable so as to avoid unnecessary rework on the part of the contractor.

8.6.1.2 Certification

A certification should accompany the material to document that the material meets the specifications, certification requirements are specified in Subsection 106.03 of the Contract. Check the certification for evidence that the prime contractor verified that the certification is acceptable. If they haven't, continue with the check, but also notify the contractor that they are expected to review the certifications before passing them on to WFLHD project personnel. Perform the check before the material is incorporated into the project work.

Verify the certification meets the required specification. Subpart 2.42 of the FLH Field Materials Manual provides detailed guidance on certifications. References may need to be made to AASHTO, ASTM, or the Contract to find out what the requirements are. If the certification is acceptable, stamp it "Checked By" with the date, and stamp the "Approved." If the certification is not acceptable, notify the contractor of that the certification is incomplete and/or incorrect. File the approved certification in the back portion of the pay item tab in the Pay Item book.

8.6.1.3 Measured and Tested

If the material was produced off-site the contractor will need to provide the required test results. Review these test results according to the process for certifications above.

If the material is produced on-site, or if the work is performed on-site, review the test results or the work itself to ensure compliance with the specifications. If the work does not meet the specification, the contractor is required to correct or replace it. In lieu of this, the contractor may request to have the work accepted at a reduced price. More information on this is provided in Section 7.6.2.

If the contractor is required to perform production testing on material accepted by the measured and tested method, enter these test results in QL-Pay. That will allow you to track the test results and ensure the material is consistent and meeting contract requirements.

The timing of this check is similar to the guidance provided for visual acceptance.

8.6.1.4 Statistical

For work that is accepted statistically, enter the test results into QL-Pay. Print a report and provide it to the contractor. This usually needs to be done only once a day, unless several tests are being performed per day, and it is imperative that the Project Engineer or the contractor know the QL-Pay status immediately.

Before determining the final pay factor for any material, provide all of the QL-Pay files to the WFLHD Quality Assurance Engineer. He will verify the final pay factor.

The test results, the variance from the target value, and the number of test results will all affect the pay factor. Depending on the standard deviation and number of tests, a lot with several test results outside the specification limit could have a pay factor above or below a 0.90.

If the pay factor falls below 0.90, Subsection 106.05 of the Contract requires the contractor to stop production. In the event this occurs, the Project Engineer should prepare correspondence to the contractor indicating that the current pay factor is below 0.90, and under Subsection 106.05 of the Contract, they are required to stop production. Provide a short synopsis of what is out of tolerance (specify the characteristic or sieves) and request them to make changes to the material or process. If the change is significant, the contractor may request to terminate the current lot and start a new lot.

If the contractor is obtaining the material from a stockpile, and all production is complete, it may be necessary for them to do additional screening or processing. If the material has already been placed by the time the test results are received and verified, reprocessing may not be practical. Section 7.6.2, Non-conforming Material or Work, provides more guidance on handling work or material that doesn't meet the contract requirements.

8.6.2 Non-conforming Material or Work

If the material or work does not meet the contract requirements, the contractor has three options (See Subsection 106.01 of the FP). They are:

- a) remove and replace the defective material or work
- b) correct the defect
- c) propose to have the material or work accepted at a reduced price

Depending on the situation, a) or b) may or may not be practical. The earlier the defect is found, the more opportunity there is to correct it. If the contractor is obtaining the material from a stockpile, and all production is complete, it may be necessary for them to do additional screening or processing. Corrective action (or removal and replacement) would be required on the material already placed. Care should be taken when evaluating materials after a Contractor's corrective efforts. One common misconception is that an individual sample and test result represents a discrete quantity of material. However, poor quality materials often contain both passing and failing quantities. One passing test may be due solely to chance.

In fact, any quantity of material is collectively represented by all the samples taken from it. Any corrective effort should be applied to the whole of any material represented by a series of samples, unless additional testing convincingly isolates the defective areas. After corrective action, additional testing must be used to verify that the corrective actions were effective.

If the material has already been placed by the time the test results are received, reprocessing may not be practical, and the contractor may propose to have the material or work accepted at a reduced price. To accept nonconforming materials at reduced payment two things must happen. The Government must make a determination that the materials will serve the purpose intended and the contractor and the Government must agree on the amount of the reduced payment. If this situation occurs, the Project Engineer should coordinate very closely with the COE and the Materials Section. The Materials Section will provide the technical advice, but the Project Engineer and the COE have to weigh the overall risks and determine the appropriate administrative action.

Since a) or b) ultimately result in conforming material or work, no further administrative action is required. However, if the contractor proposes to have the work accepted at a reduced price, the Government is allowing a deviation to the Contract, and a contract modification is necessary. The modification should address a this-for-that tradeoff. The Government gets a lesser product than it originally bargained for, and the contractor gets less compensation than they originally bargained for.

When determining the value of the price reduction, coordinate with the Materials Engineer for materials items, and the COE for other work items.

CHAPTER 9

QUALITY CONTROL, QUALITY ASSURANCE AND INSPECTION

9.1 CONTRACTOR'S QC PLAN

9.1.1 Definitions

Contractor quality control (QC) is the sum total of activities (inspections, tests, checklists, measurements, instructions and communications) completed by the Contractor that are specifically performed to ensure that items of work meet contract requirements. Results from QC activities allow the Contractor to assess and adjust production processes and methods to control the level of quality being produced for a specified end product.

9.1.2 Responsibility

The responsibility for quality control on all construction matters lies with the Contractor. The Contractor is ultimately responsible for the quality of all work performed under the contract, and has primary responsibility for testing of all materials and any specified field tests. The goal of the QC system is to assure that the project in its entirety is delivered in accordance with the contract requirements (materials, workmanship, tolerances and schedules).

9.1.3 Content of the Contractor's QC Plan

The Contractor's QC Plan should minimize any parroting or paraphrasing of requirements in the contract, and should avoid simply promising to comply with the contract. These kinds of statements and assurances are of essentially no added value. The QC Plan must go beyond standard or generic descriptions and should address the Contractor's activities and processes for consistently delivering the level of quality that the contract requires. WFLHD form 471 (Exhibit 9.3A) has been developed to provide a consistent structure and methodology for completing contractor quality control plans for specific items of work. There are 9 primary quality control activities that are defined on the form and in our specification. Following the requirements of the form will lead to a detailed and usable contractor quality control plan. The key to a useful plan is that the plan must be as specific as possible in describing the quality control activities.

9.1.4 Updating and Using the QC Plan

QC plans are living documents and should be continually updated and revised as needed by the Contractor. The Contractor and the Project Engineer should constantly refer to the QC Plan during the life of the project. QC plans that are approved and then quickly placed in the file not to be looked at again are of no value. Contractors should constantly be reminded to adhere to, to update as needed and comply with their QC plan. It is highly recommended that Contractor QC Plan is championed and enforced by the Project Engineer and the project staff.

9.2 REVIEWING THE CONTRACTOR'S QC PLAN

When reviewing QC plans, ensure that the Contractor describes the QC personnel, and what inspections, tests, and activities will be performed for the start up, production, and closeout phase of each component of work. WFLHD form 471 provides the basis of contractor quality control plans. Quality control activities 1 thru 9 are the basis of the quality control activities and need to be described thoroughly in the plan

QC plans should be specific as to **Who, What, When, Where** and **How**. For each described quality activity for each component of work, the QC plan should answer these questions.

9.2.1 Who

Who will be responsible for QC throughout the operation? A Quality Control Technician may be assigned responsibility for testing and documentation and perhaps even training and monitoring of startup. As the operation moves toward production and closeout however, other QC personnel may be assigned increasing responsibility.

9.2.2 What

What will be done? What component of work, what stage and at what frequency will work be inspected and tested? What will be inspected . . . grade?, alignment?, spacing of reinforcing steel?, construction survey staking?, aggregate gradations? What authority will the person have over operations? What portion of the time during the work will the identified person actually be present to perform QC responsibilities? Testers and inspectors cannot control quality if their responsibilities are limited to testing, measuring and documentation. "What" should address not only personnel and activities, but materials and equipment used in the construction. These items often have stated or implied contract requirements, and the QC system must verify that those requirements are met. What documentation will be provided to record inspection and results of QC inspections? When a QC process identifies deficiencies what will be done?

9.2.3 Where

Where will these activities be performed? Will optional production testing and inspections be performed? Will manufactured materials be inspected at the plant, at the Contractor's facility or at the site of work? Will the equipment be inspected at the yard, or will inspections be performed at the site?

9.2.4 When

When will these activities be performed? How many inspections or tests will be performed at what frequency? The earlier QC activities are performed, the more latitude the Contractor has in dealing with problems. However, when activities are performed too early there is a risk of unforeseen changes or glitches prior to actual construction. When will test results and inspection narrative be available? This is a key component of the QC plan, which determines largely how responsive the plan can be to deficiencies.

9.2.5 How

How will inspections or any QC activity be performed? Will standard checklists be developed from the specifications? Have arrangements been made with subcontractors or others to provide access to the work? What equipment will be needed to perform the inspections or tests? What documentation will be produced as a result of the inspections or tests? The more generalized and vague the inspection procedures are, the more likely they will not be consistently effective.

9.3 CONSTRUCTION MANAGEMENT TEAM'S QA ROLE

The project office staff (Project Engineer and Inspectors) is responsible for Government quality assurance on the project. This is done through daily inspections, testing performing at the WFLHD Materials Laboratory, and other field work such as reviewing material certifications. Essentially, the Project Engineer and Inspectors are responsible for verifying and documenting that the project is constructed in reasonably close conformity with the plans and specifications, and in compliance with the terms of the contract.


The project office staff is also responsible for reviewing the Contractor's daily submittals (*Contractor's Daily Record of Construction Operations, Daily Quality Control and Quality Assurance Report, Notification of Completion of Work, WFLHD-470*), and preparing their own documentation of project happenings.

Continuous or full time inspection should be avoided whenever possible, as it tends to result in WFLHD taking over the Contractor's quality control and quality assurance responsibilities. However, it is recognized that some work is of such criticality or is being obscured by subsequent construction to the extent that continuous inspection is prudent.

Unless otherwise provided for in the plans or specifications, construction methods and sources of materials are the Contractor's option. The Project Engineer may suggest methods of improving workmanship, and may suggest sources of better materials. However, it should always be clear that these are just suggestions, and that the decision is up to the Contractor. In the event the Contractor's methods continue to produce unsatisfactory work, and the Contractor will not accept suggestions, the Project Engineer should discuss with the COE the possibility of ordered changes, stoppage of nonconforming work, or in extreme cases, a "Show Cause" notice.

It is highly recommended that project staff does not usurp or take over the contractor's quality control responsibilities. Be prompt to include the contractors' management and quality control staff in all matters related to quality control. If project staff "assists the contractor" by solving quality control problems directly with the working crews on a regular basis, the contractor will lose motivation to provide their own inspection or quality control and the responsibility for providing quality control will constructively shift from the contractor to WFLHD.

CONTRACTOR QUALITY CONTROL PLAN WORKSHEET

Work Feature: Bid items associated with the work: is a WFLHD 470 required for this feature of work? <small>(Add pages (attachments) as necessary.)</small>	Yes		No		WFLHD FORM 471
	Who will perform the task?	What will be done to accomplish the task?	When and where will activities be performed and at what frequency?	Purpose and Benefit	
 <p>Independently and with contractor staff review contract requirements plans and specifications.</p>					Assign QC individuals to be fully knowledgeable of the contract requirements. Use this individual to act as a resource for project staff to assist in determining requirements of the work. Knowledge of requirements will improve decision making for project staff allowing maximum performance and efficiency in completing work requirements.
Check and verify submittals, plans and materials certifications for contract requirements and submit to FHWA. Provide statement and signature of verification.					Prompt and accurate review of submittal and certifications from fabricators and suppliers will ensure quick turnaround of FHWA acceptance. Repeated submittal transactions drains time and resources.
Check site conditions for constructability, including staging, disposal and storage areas. Identify potential quality control issues. Verify the materials delivered to the site conform to accepted materials certifications, submittals, plans and contract requirements.					A visual review of site conditions that analyzes constructability staging, materials delivered and other operational factors could uncover some aspects of the work that have not been foreseen. Making a prolog of this will increase productivity and ensure maximum efficiency during startup of operations.
Review construction staging to assure accuracy and sufficiency at each stage of construction. See Table 163-2 and Section 163 Construction Survey & Staking					Completing a systematic check of construction staging to ensure sufficiency and accuracy can save costly delays and expensive rework because of inaccurate survey. Develop a check method to ensure that layout and staking is correct and appropriate for the work. Develop an understanding of the information that will be conveyed by the staking.
Complete operational work plan. Provide brief written narrative of the work activity describing methods, locations, crews, equipment and processes that will be used to complete the work.					Developing a work plan ahead of time is key to efficient performance. Sharing that knowledge in written form is instrumental in obtaining cost efficient performance. Sudden changes in work plan and methods due to oversight of essential requirements can be fatal to cost efficiency.
Conduct pre-work meeting. Review contract requirements jointly with construction crew, foreman and FHWA personnel prior to beginning work.					Keeping the crew and the FHWA staff informed of methods, special considerations and expectations developed in the operational workplan is critical to a successful operation. Good communication should lessen misunderstood job requirements, inefficiency and re-work.
Verify that the ongoing construction will result in the end product meeting the contract requirements. Verify by inspecting, measuring and testing. See table 163-1 & 163-2. Perform corrective actions					The key to efficient production and acceptance is to ensure that adequate inspection and quality control has been performed prior to FHWA acceptance. Enabling your organization to perform quality control testing and inspection as the work is in the production stage allows adjustments to be made at an early stage. Rejection of completed work is costly and can be avoided by practicing good quality control. A structured approach to self-verification is beneficial.
Provide immediate presence to communicate status of work to FHWA personnel and contractor personnel for quality control issue resolution.					Close and prompt contact with FHWA is beneficial to solving construction issues during early stages of work. The sooner that issues are resolved the more efficient and productive work can be. It is in both the contractor's and the owner's interest to solve problems promptly as close to the issue as possible. Lengthy delays in finding the right personnel to resolve issues with cost time and wastes resources.
Verify completed work meets contract requirements. Implement Notification of completion of Work as required. See 163.06					Self inspection of initial, production and followup work phases should be defined to ensure that work is meeting requirements as it is performed. This is an essential part of quality control to verify that the product meets contract requirements. It should include visual inspections, verification measurements and testing. When deficiencies are found, establish criteria for preventing recurrence.
Contractor Quality Control Manager Approval Signature _____ DATE _____ FHWA Acceptance Signature _____ DATE _____					
QC Reports - As quality control activities (1) thru (8) are performed, provide reports of activities including discussions, reviews, inspections, measurements and testing results. Include deficiencies encountered and description of corrective actions completed. See 163.04(b)(1)					

WFLHD form 471
(Exhibit 9.3A)

9.4 INSPECTION GUIDANCE

9.4.1 Clearing and Grubbing

9.4.1.1 Preliminary Review and Approval

The vegetation and debris to be cleared, grubbed, removed, and disposed of under this section, includes all surface objects, trees, stumps, roots, and other protruding obstructions within the designated limits except such objects as are designated to remain in place or are to be removed under other contract items.

Before clearing and grubbing operations begin, the Project Engineer should address the following matters:

- Have the limits of all areas in which the Contractor will be required to perform work clearly marked. It should be made clear to the Contractor what access has been provided for the Contractor and for those property owners adjacent to the project.
- Go over the job with the Contractor and discuss the work to be done and any special details. Such details should include trees to be saved, stakes and survey control points to be preserved, and all known utilities that could be damaged during clearing operations. The general clearing procedure and disposal of materials should also be discussed. Review the topsoil requirements with the contractor and verify the order of operations or if there are special requirements which require the topsoil to be removed prior to grubbing.
- Review all timber agreements and discuss with the contractor the ownership of the timber and any special hauling or branding requirements.
- Have all trees, shrubs, survey or historical markers, objects of historical or archeological value, etc., that are to be preserved or remain in place, clearly marked and make the Contractor aware of their location.
- Go over erosion control requirements. See Section 9.4.4.
- Review the disposal requirements for slash, stumps and nonmerchantable timber. Discuss permits and special requirements for burning.

9.4.1.2 Construction Inspection

Inspection is usually a matter of intermittent checks, once the Contractor's supervision and understanding of requirements has been verified. Special circumstances such as a high degree of environmental sensitivity in some National Parks may dictate more frequent reviews. The inspector will usually be concerned with the following:

A. Equipment and Methods

The choice of equipment and methods used for this work is usually left to the Contractor, so long as the work is performed in a satisfactory manner. However, there may be limitations to the Contractor's choice as dictated by the specifications or common sense, (i.e., specific control of the use of explosives in congested areas).

B. Removal of Trees, Undergrowth, Stumps and Roots

Trees, stumps, and large roots should be removed from excavation areas to a depth sufficient to prevent such objectionable material from becoming mixed with the material being incorporated in the embankment. These areas to be excavated will normally require grubbing to remove small bushes, vegetation, rubbish and other objectionable material. For areas under large fills, consult the contract to verify the fill heights for which stumps may remain and not need to be grubbed.

C. Removal of Material Outside Clearing Limits

It may be desirable to remove downed timber, etc., outside the originally established limits for clearing and grubbing. When there is no item for *Individual Removal of Trees*, or when these situations are not covered in the special contract requirements, they should be considered for a contract modification.

D. Preservation of Objects Designated to Remain

Precautionary measures must be taken to protect objects designated to remain in place, from damage during clearing and grubbing and other construction operations. These objects may include trees, shrubs, survey or historical markers, objects of historical or archaeological value, and others. Clearly marking such objects and making the Contractor aware of their location will help insure their preservation.

Trees close to the top of high cut slopes should not be designated for preservation as they may become a traffic hazard or threaten the stability of the slopes.

Trees at the bottom of fill slopes should be removed beyond the slope limits, including rounding, unless tree wells or similar provisions for protecting them are included in the contract.

E. Timber to be Saved

When merchantable timber is to be saved, it must be trimmed, sawed, and stockpiled in accordance with the special contract requirements. When there is no suitable place along the highway to stockpile timber to be saved, it may be necessary to clear an additional area for stockpiling. The length of haul of this timber to stockpile areas should be kept to a minimum. The areas of such additional clearing should be included in the measurement for payment, and approved by the Project Engineer in cooperation with land owning agency.

F. Rehandling

Contractor is entitled to no additional payment in the event of any rehandling of refuse caused by an order from the Forest Service or other legal authority, to delay burning. Such orders should be requested in writing and should be conveyed to the Contractor in a manner which makes it clear they have not been initiated by Federal Lands as a contractual action.

G. Hazards

Clearing and grubbing operations, particularly in dense, tall timber regions, can be very dangerous. Federal Lands personnel should make certain that the Contractor's operation does not endanger them, result in potential hazards to the traveling public, or create damage to existing facilities in or adjacent to the right-of-way.

9.4.1.3 Measurement

Methods of measurement must be consistent with Contract. Specifications should be reviewed closely for any exceptions to the general practice of including all area designated for clearing in the measured quantity, whether some parts require physical clearing effort or not. For example, the area of existing roads lying within the area staked for clearing are not deducted from the area otherwise measured unless the contract specifically provides for such deduction.

9.4.1.4 Documentation

The Project Engineer is responsible for documentation of the required compliance with specifications, and for the field measurement notes and computations for pay quantities. Compliance is usually documented by IDR or diary entries, and photographs. Original (authorized) quantities are generated with earthwork quantities. Adjustments and additions may be in a field book. Quantities are summarized in the Progress Estimate Book with indications as to when each section is complete or partially complete noted and reflected in the computations. Whether field measurements and/or computations are made by Contractor or Government crews, the Project Engineer must arrange for reasonable verification processes. Collect load tickets for merchantable timber hauled off the project when required by the contract or timber agreement.

9.4.2 Removal of Structures and Obstructions

9.4.2.1 Preliminary Review and Approval

Before operations begin, the Project Engineer should go over the project with the Contractor and clearly identify any structures and obstructions to be removed. When the bid schedule does not contain a bid item for removal of structures and obstructions, removal within the designated construction limits should be considered a subsidiary obligation of the Contractor. However if the obstruction was not apparent during the bidding, and so unusual that it could not reasonably have been anticipated, the Contractor may make a case that it is compensable as a differing site condition. There may also be instances when it is desirable to remove structures that are not within these limits. In such cases, if the removal of such structures is not covered in the special contract requirements, they should be considered for a contract modification.

9.4.2.2 Construction Inspection

As with clearing operations, precautionary measures must be taken to protect objects designated to remain in place from damage during these operations. Clearly marking such objects in the company of the Contractor will help insure their preservation.

To aid in documentation, the project should be reviewed just after award to verify the location and quantity of obstructions as indicated in the plans.

9.4.2.3 Measurement

The method of measurement must be consistent with the Contract. Usually removal items are measured by *each* or *lump sum*. For items measured by length, measure the item in place before removal.

9.4.2.4 Documentation

The Project Engineer is responsible for documentation of the required compliance with specifications and for the field measurement notes and any computations for pay quantities. A separate field book may be appropriate, especially if the work is extensive. Otherwise, the book used for clearing or for miscellaneous items, can be used. Each structure or obstruction to be removed should be identified by location, measured, if appropriate, date of removal documented as well as place of disposal (if known). The summary book should include reference to the primary record.

9.4.3 Excavation and Embankment

9.4.3.1 Preliminary Review and Approval

The specifications provide that all suitable excavated material shall be used in the formation of embankment, subgrade, shoulders, slopes, bedding and backfill of structures, and for other purposes shown on the plans or as directed. The specifications also provide authority for making changes in the plans and specifications during the course of construction to adjust them to field conditions. Changes which affect the Contractor's unit costs or time of performance may warrant an equitable adjustment.

If the Contract requires the Contractor to furnish embankment material from sources of its own choosing, and if excavation from the roadway prism is incidental to an embankment pay item, the Project Engineer is usually concerned only with material quality, compaction, and geometrics.

Likewise if the Contract indicates that borrow may be necessary but no pay item for borrow is provided, the Project Engineer should prudently *monitor* quantities and how they are used, but normally is not required to actively *manage* these quantities.

Other contracts will require embankments to be constructed, or constructed in part, from materials to be excavated, and excavation will be a pay item. This is the predominant design scheme in many areas of Federal Lands work, particularly for projects in rugged terrain. The intent (which is also a condition of the

Contract) is for the grading work to *balance*. That is, the cuts are to provide adequate material to make the fills. If that is not possible then a borrow item, and often a source for that borrow is provided. The designer must estimate how much the excavated material will shrink, or swell as it is placed and compacted in the embankments. Soil is usually expected to shrink, while shot rock will swell. Usual materials are a mixture. The Project Engineer should attempt to monitor the early grading work for verification of the designer's adjustment factors. This will sometimes provide lead time to correct for errors, perhaps by adjusting slopes in areas not worked, or by adjusting grades or alignment, or by finding waste or borrow areas. Failure to make the earthwork balance when the Contract indicates that it does, may result in a dispute over disposal of excess excavation or the importation of necessary borrow.

It is the responsibility of the Engineer to recommend or make changes found necessary to meet field conditions encountered during the progress of the work. It may be necessary to flatten slopes for stability or revegetation. Where more rock is encountered than anticipated, economy will dictate the steepening of slopes. Changes in grade, alignment, and/or slopes may be necessary to balance quantities, avoid wasting materials, and minimize overruns in excavation quantities. Redesign of the thickness of topping, subbase or base course may be dictated by variations in the quality of subgrade materials. In making or recommending changes, the Project Engineer should be guided by Chapter 3 of this manual and instructions from the Construction Operations Engineer. Insofar as possible, the need for contract modifications should be anticipated and issued before the Contractor starts grading operations in the areas involved. However, it should be kept in mind that changes which increase the Contractor's cost or time of performance can have an additional effect on cost of the remaining work.

Periodic inspection of the construction of side slopes and drainage ditches is necessary. If the Contractor excavates outside the slope stakes, or below subgrade except as required, gouges or undercuts the slopes, or causes significant overbreak, the Project Engineer should immediately advise the Contractor, in writing, that the specifications do not permit payment for such material. Before the work is accepted, the roadway shall be reasonably close to the required alignment, grade, and cross section.

The Project Engineer should discuss with the Contractor, the importance of exercising care in blasting operations to ensure landscape preservation in National Forests and National Parks, and protection of abutting privately-owned property where such property is involved. The Project Engineer should ensure that the Contractor's Blasting Plan reflects this level of concern prior to approving it.

The Project Engineer should observe the Contractor's methods of drilling, blasting, and other grading operations for compliance with the protection and restoration of property provisions of the Contract. The Standard Specifications provide for restoration (at the expense of the Contractor) of any landscape features damaged by Contractor operations. However, the objective should be, to avoid such damage in the first place.

If blasting causes a scattering of material beyond construction limits, the land owner or agency be consulted, in the presence of the Contractor, to determine an acceptable method of removing the material without further damage to the property. In the event that damage results to privately-owned property, and repairs are not promptly made by the Contractor, the Construction Operations Engineer should be consulted and appropriate action taken.

9.4.3.2 Construction Inspection

Inspection at random intervals will usually be adequate, if decisive corrective action is ordered relative to any deficiencies found.

A. Materials

Preliminary sampling and testing of excavation, borrow, and subgrade materials normally will have been performed for design purposes prior to award of the contract. The preliminary design data furnished to the Project Engineer may include classification, moisture-density relationship, and color and texture of the soils sampled during the preliminary soil survey.

It is the responsibility of the Project Engineer to see that sufficient supplementary samples are taken and tested during construction, to verify classification, moisture-density relationships and other assumptions made during the design are consistent with the actual constructed conditions.

If the Contract makes specific quality requirements for the subgrade or other portions of the embankment, then verification of those quality requirements is a part of the Project Engineer's responsibility. If there are no specific requirements, then the Project Engineer can request certain better materials be conserved for, say subgrade. But if the Contractor's operations make it uneconomical to do that, the Government may consider a Contract Modification, or it may have to reevaluate its pavement structure design in areas where the below average materials are used. In the latter case, it becomes particularly important to compare the design assumptions with actual conditions.

The Project Engineer should request the soils and/or pavement design report. The report may provide the most significant factors considered in design, including traffic loading, soil support values, and climatic and environmental conditions. It will aid in making an assessment as to whether conditions encountered differ from design assumptions.

Additional information on sampling and testing is contained in Chapter 5 of this manual.

B. Borrow

When borrow excavation is included in the bid schedule, the Contractor is required to furnish necessary material from sources designated in the Contract, or from sources the Contractor provides. In either case, the material must meet the gradation and quality requirements of the Contract. The standard specifications provide that borrow used when roadway excavation material would have been available, will be deducted from the borrow volume (not paid for). It is intended that borrow material not be placed until after all reasonably accessible roadway excavation has been used, or will be used. Contractors who, for reasons of efficiency want to bring in borrow before all excavation has been performed, should be advised that they run the risk of having borrow quantities reduced if excavated material is left over.

Another method is often used for projects requiring a significant quantity of material hauled in for embankment construction. This is to simply specify and pay for embankment material from the Contractor's selected sources. The Contractor is paid for the quantity of embankment rather than excavation or borrow. Any excavation required on the project is considered incidental to the embankment pay item, or will be called out as a separate pay item.

Selected borrow for topping is often specified on grading projects where soil conditions are poor. This material is obtained from sources as above, and will usually have more stringent gradation and quality limits specified than borrow for embankment construction.

The selected borrow for topping item may be reduced (or eliminated) if a suitable substitute is found in the excavation or borrow operations. Unless the Contract specifically requires such materials to be identified and used in the subgrade, the change would require a Contract Modification.

Even if better materials are ordered conserved for subgrade use, it is generally not economically practical that such materials be excavated and stockpiled, and later used in the work. Conservation for topping should be accomplished by leaving the material in its original position, whenever practical.

When a source of borrow material proposed by a Contractor for use has not been previously tested and approved, it is the responsibility of the Contractor to submit records of exploration and testing to support a request for approval. If the source is not an open commercial source, environmental and archeological clearances may also be required. Approval of the source should be made to apply only to those portions from which acceptable material can be obtained.

Borrow pits, other than those contemplated in the design, may be required to provide material of the quality and quantity necessary to complete the project. When additional borrow pits are necessary and it is determined the Government will provide them, concurrence of the Construction Operations Engineer should be obtained and approval by the local Forest or Park Service officials secured (where such jurisdictions are involved) before pits are staked. If the pits are on private lands, right-of-way agreements shall be executed and any question of royalty settled before they are staked. It is very unusual for Federal Lands to attempt to negotiate a borrow pit on private land, especially in the midst of an ongoing contract.

If additional right-of-way or an easement is required to expand a designated pit, the Project Engineer should obtain necessary property descriptions and forward them to the Construction Operations Engineer for appropriate action. The Construction Operations Engineer should also be consulted relative to any permits likely to be required. These might relate to State mining laws, laws governing wetlands, etc.

Whenever practicable, borrow pits should be located outside the limits of view of the project. In timbered country they should be located a minimum of 100 meters from the roadway, in open country a minimum of 300 meters.

It is sometimes faster and no more expensive to assign responsibility for the source of any required borrow material to the Contractor, and structure the contract or contract modification on that basis.

C. Topsoil

When the plans or specifications provide for removal and storage of suitable topsoil, only soil which can sustain a growth of vegetation should be conserved. Most soil will sustain growth, if given the fertilization. If the Project Engineer has doubts, the Federal land management agency associated with the project may be able to help. That is, the Forest Service or National Park Service may employ specialists locally who can be consulted.

D. Presplitting Rock Cuts and Blasting Plans

Before starting drilling operations for presplitting rock cuts as specified in the specifications, the Contractor is required to furnish a drilling and blasting plan. The drilling and blasting plan is to document that the Contractor has a plan for accomplishing the work. Its approval or acceptance by Federal Lands does not absolve the Contractor of responsibility for using proper drilling and blasting methods to achieve the required results. The Project Engineer should evaluate the plan, and bring to the attention of the Contractor any apparent weaknesses or proposed procedures which are contrary to the Contract. The Project Engineer should closely inspect initial operations, methods being used and the results obtained. When satisfactory results are not obtained, the Project Engineer should order a revised plan.

Critical factors in successful presplitting are hole diameter and spacing, hole deviation, charge distribution, and confinement. Test blasts, as required by the Standard Specifications, will help to determine the optimum drill pattern for each job. In practice it has been found that the denser, less fractured, and more homogenous the material is, the larger the hole diameter can be, the less explosives will be required, the greater the distance between holes, and the better results will be obtained.

Successful presplitting operations indicate a spacing of 0.4 to 0.75 meters, center to center, and a hole diameter of 50 to 100 millimeters. Charges taped at 0.3 to 1.0 meter intervals to a down line of detonating cord with heavier loads placed at the bottom of the hole have been used; however, lighter loads are required in weak rock masses. Explosives packaged in long narrow cardboard tubes that can be coupled into a continuous column as they are placed in the hole can be used in place of the taped loads. These have proven to be effective.

Hole depth in presplitting is limited by the difficulty in drilling accurately aligned holes. This is dependent on the quality of the rock mass. Deviation of greater than 150 millimeters from the desired plane of shear will give inferior results. Generally, 15 meters is the maximum depth that can be used without significant deviations of alignment unless unusually large diameter holes are permitted.

Presplitting can be accomplished in conjunction with the primary blast by delaying the primary holes so that the presplitting holes will fire ahead of them. Shooting far in advance of primary excavation can be troublesome if the rock characteristics change and the load causes excessive shatter in weaker areas. By carrying the presplitting only one-half shot in advance of the primary blasting, the knowledge gained from the primary blasts regarding the rock can be applied to subsequent presplitting shots. In this manner, the loads can be modified if necessary, and less risk is involved as compared to presplitting the full length of the neat excavation line before starting the primary blasts.

The above considerations are typical of the issues addressed by the Contractor in the Blasting Plan. It is not Federal Lands' intent to order methods and procedures beyond those in the Contract. Certainly if the Contractor has difficulty achieving required results, these and other issues should be discussed with the Contractor and with trained blasting specialists if the Project Engineers is uncertain of his/her own ability to deal with the technical issues.

Although not normally required, some contracts may, for aesthetic reasons, require the removal or obliteration of remaining drill holes in cut faces.

E. Prewatering Excavation Areas

In some areas, prewatering of excavation areas by sprinkling, flooding, or irrigation provides more uniform distribution of moisture with less water than truck watering in the embankments. This will also reduce the need for manipulation of the soil on the roadbed. When prewatering is used and water is specified as a pay item, the Project Engineer must closely observe and evaluate the prewatering operations to avoid payment for wasted water. The special contract requirements may limit the pay quantity to the amount required to provide the proper moisture content for compaction to specified densities.

F. Slope Rounding and Warping

Slopes are to be rounded as indicated on the plans. The method of measurement and basis for payment is specified in the Contract.

The Project Engineer should encourage the Contractor to perform the slope rounding as a part of rough grading operations, rather than doing it as a special operation after slopes are otherwise finished. This will usually minimize the work involved and improve its overall quality.

In order to obtain reasonably smooth and uniform surfaces required by the specifications, slopes should be warped and adjusted to harmonize with existing landscape features. The Project Engineer can help assure the desired results by carefully reviewing the slope stakes on the ground and ordering appropriate adjustments before grading work begins.

G. Waterways and Ditches

Satisfactory drainage often is difficult to secure, particularly in flat country. Except when ponds are specified, waterways should drain quickly and efficiently away from the highway. Cut ditches should be flared out away from the roadbed at the end of the cuts and extended on the natural ground to a point where water will not discharge along the junction of the fill slope and the natural ground. Abrupt changes in these outlet ditch grades should be avoided to prevent erosion or silting. If possible, the flow line slope of waterways should not exceed that which is proper for the material. Where that slope is exceeded on steep grades, the Project Engineer should consult with the Construction Operations Engineer to determine the need for additional cross drains, paving of waterways, or other corrective measures to prevent scour. Extra wide sections require special consideration, especially when super elevation may increase scour or erosion potential.

Where considerable surface drainage over the top of a high cut appears likely, the Project Engineer should consult the Construction Operations Engineer regarding measures to be taken. One method of correction would be the construction of ditches above the cut to intercept and lead the flow to natural drainage courses. Such ditches should be far enough away from the edge of the cut to prevent seepage sufficient to cause sliding, and should not be so steep as to cause erosion. Unless shown on the plans, construction of such ditches in sensitive areas, such as on Park or Parkway projects, should not be undertaken without the agreement of appropriate Park Service officials. Right-of-way for such ditches may be a consideration for some projects.

H. Subdrainage

Thorough attention to subdrainage is essential to the life of the road and will result in reduced maintenance costs. Should the Project Engineer suspect the presence of subsurface water in such quantity as to affect the stability of the roadbed, and if corrective measures have not been provided in the plans and specifications, appropriate action should be taken to correct the problem. Stabilization may be accomplished by the simple installation of underdrains under certain conditions. Other conditions may require special investigation and more involved designs using geotextiles. The Project Engineer should consult with the Construction Operations Engineer or FLH specialists when simple underdrains are deemed inadequate for the field conditions.

I. Embankment Foundation Preparation

The quality of embankment construction depends on the proper preparation of the foundation. The presence of subsurface slippage planes, soft or saturated material, and springs or seepage are some of the conditions which may cause embankment failures. These require careful attention.

The plans and/or special contract requirements will usually provide corrective measures for unstable foundation conditions known to the designer. Some may not have been known. Clearing and grubbing

may expose them. Before embankment construction begins all embankment areas should be examined to determine any need for corrective treatment. Some areas of questionable support may only require subgrading. Others will require extensive systems of underdrains, filter blankets, rock trenches, or rock embankment.

During the construction of embankments on hillsides, particular attention should be given to obtaining the best possible interlock between sloping original ground surfaces and the new embankment. Sufficient benches should be excavated to assure a firm bearing on solid material. Payment for the benching will depend on how the specifications are written. If not addressed in the specifications, a contract modification may be required.

One of the most frequent points of embankment failure is the area where the roadway changes from excavation to embankment. It is advisable to explore these areas for possible need of underdrains to remove seepage water. The benching operation described above should be very carefully followed in these transition areas.

For any embankment area where the foundation treatment and/or Contract items provided in the Contract seems inadequate for the actual field conditions, advice of the Construction Operations Engineer should be sought.

J. Embankment Failures -- Causes and Corrective Measures

Embankment failures or displacements are due mainly to improper design or construction, or both. Four major causes of embankment failures are discussed below. The design should be based on a thorough exploration of foundation conditions and available embankment materials. Serious failures occurring or expected during project construction should be corrected on the basis of subsurface investigation and analysis. The Project Engineer should consult the Construction Operations Engineer to arrange this.

- (1). **Failure due to weight of the embankment displacing soft foundation material.** This failure is usually characterized by an en masse drop and lateral movement of a portion of the fill. To provide a satisfactory embankment over a soft foundation, three approaches may be taken:
 - **Removal and replacement of soft soil with suitable material.** This may be the most economical method to depths of about 3 meters.
 - **Reduction of applied shearing forces.** This can be accomplished by reducing the height of the embankment, using light-weight material in the embankment, and by either flattening the side slopes or by using toe berms.
 - **Strengthening of the soft foundation soil.** This can often be accomplished through consolidation. Drainage ditches may be used to lower the water table and consolidate the foundation soil under its own weight. Foundation strength may be allowed to keep pace with increase in load by providing adequate time for foundation consolidation. A sand blanket placed directly on the soft foundation soil, or vertical sand drains in combination with a sand blanket, will increase the allowable rate of consolidation. This rate must be controlled by field measurements during construction.
 - Pavement failures due to excessive consolidation of the soft foundation soil may be reduced by removing the soft material, providing sufficient time for consolidation before paving, or by accelerating the consolidation by the use of a temporary surcharge and one of the drainage methods noted above.
- (2). **Failure due to loss of stability of embankment through impounding of hillside seepage water causing saturation.**

This type of failure is usually identified by characteristic sloughing of part or all of the fill. When opened up, the impounded water will usually gush out until the hydrostatic pressure is relieved. Prevention of such failures usually lies in providing for escape of seepage water by means of subdrains or placement of very porous material in the lower part of the fill.

(3). Failure due to the weight of embankment causing movement on a well defined slippage plane in the underlying foundation.

This type of embankment failure is generally characterized by bodily movement of the fill, without sloughing. The usual correction is to intercept and remove the subsurface water by trenching or placing subdrains above the fill.

(4). Failure due to horizontal stresses produced by the weight of the fill being greater than the corresponding shearing resistance.

This condition occurs when the slopes are too steep for the height of the fill and the type of the material, or when the material is insufficiently compacted. Proper compaction and correct slope design are both essential for permanent fill stability.

K. Embankment Compaction

The need for adequate compaction of embankments should be strongly emphasized. Compaction of the lower portions is necessary to prevent settlement and provide stable slopes. It is important in the upper portions and subbases to provide bearing capacity, control volume change, and provide uniformity.

All embankments are to be compacted in accordance with the Contract specifications. The specifications normally do not prescribe the type of compaction equipment to be used. Unless otherwise specified in the special contract requirements, the Contractor is free to use equipment of its own choice, provided it will compact the embankment in accordance with the Contract requirements.

The Contractor is required to bring the embankment material to a uniform moisture content suitable for compaction and to compact the embankment until it consistently meets the Contract requirements.

It is the responsibility of the Project Engineer to verify that the moisture-density relationship of each type soil to be used in embankments is determined in accordance with the test methods specified. In most contracts the actual sampling testing and documentation will be the responsibility of the Contractor. As discussed in 9.4.3 of this manual, this will require use of preliminary soil data and supplementary sampling and testing of any soils encountered during construction which are different from those sampled during the preliminary soil survey.

The specifications usually require density tests of compacted embankment material to be made in accordance with AASHTO T 238, or other approved methods. In place moisture is determined by AASHTO T 239. The Project Engineer should make observations and reviews of density tests to insure that prescribed procedures are being used, required density is being attained, and adequate documentation is being maintained.

If more than one type of soil is being compacted into embankments, the selection of the proper moisture-density curve becomes as important as the density test itself. It may be necessary to use a family of curves (AASHTO T272) in combination with a one point proctor in order to select the proper curve.

In gravelly or rocky soils a coarse particle correction (AASHTO T224) or a family of curves may be necessary to correct for differing percentages of coarse particles in the field as compared to the original proctor. This is especially true when a nuclear gauge is used in gravelly soils. A sample may be required in order to compute a coarse particle correction each time a density test is taken.

During construction, a record of all relative density tests should be maintained on a chart drawn to convenient scale. This may be done on a roll of cross-section paper with both plan and profile plotted as horizontal lines. Depth and location tests and retests can thus be easily shown in relation to grade and centerline station.

The success of compaction operations is dependent to a large extent on proper moisture control. If the proper amount of moisture is uniformly distributed throughout the embankment layer, rarely will there be any difficulty in obtaining satisfactory compaction, provided the thickness of the layer does not exceed the capabilities of the roller being used. The common tendency to construct earth embankments at moisture contents on the dry side of *optimum* makes the task of securing uniform moisture distribution and satisfactory compaction more difficult. Usually, it is better to begin compaction with the moisture content slightly high; however, in humid areas it may be better to begin with the moisture content near optimum.

The mixing and blending of soils and water should be thorough. Large clods and lumps must be broken down to insure a uniformly moist condition. Whenever it is necessary to blend moisture into very plastic clays, heavy plowing and turning of the soil will usually do the job satisfactorily; however, in certain extreme cases some type of mechanical mixer may be needed.

When adding water to a layer of material, care must be taken to avoid overlapping or gapping between successive passes of the water distribution equipment. Wet or dry streaks are undesirable and should be avoided. Application of water should begin on one side of the embankment and progress across to the other side to avoid having wet or dry streaks in the center of the embankment. It is better to make several light applications rather than one heavy application of water.

In lieu of applying water to material in the embankment to attain the proper moisture content for compaction, the excavation or borrow areas may be prewatered as discussed in **E.** of this subsection.

In using density tests to determine the adequacy of compaction, recognition should be given to causes of variations in test results which are to be expected in using this method of compaction control. Exact representative samples are seldom possible. When it is not possible to properly perform meaningful tests due to high rock content or for other reasons, explanation as to why the tests were not made should be entered on the form provided for recording the test results.

L. Disposal of Surplus Material (when off-site disposal is not a Contractor responsibility)

Unavoidable waste or surplus from roadway and structure excavation is to be utilized, to the maximum extent practical, to widen embankments, flatten slopes, and provide parking areas. Proper distribution is necessary to secure uniform appearance of the finished roadway. Boulders or rocks brought to the surface by scarifying generally are to be covered in embankments or disposed of as authorized by the Contract.

The necessity for widening of embankments should ideally be determined early enough that such widening may be incorporated in the originally planned embankment. If surplus material is developed after the nearby embankments have been completed, it should be used to fill pockets on the uphill side of embankments, or hauled and wasted in other suitable disposal areas.

Proposed disposal sites for any significant quantity of unanticipated surplus material should be discussed with the Construction Operations Engineer and representatives of cooperating agencies. There may be need for permit consideration in accordance with State or Federal regulations.

M. Finishing Earthwork

Before the finishing operations begin, the Project Engineer should carefully check the roadway to see that the earthwork is in reasonably close conformity with the staked lines, grades and cross sections. The Standard Specifications require the roadway to be finished to reasonably smooth and uniform surfaces. Refer to Chapter 1 for a discussion of tolerances not explicitly specified.

9.4.3.3 Measurement

Refer to the appropriate measurement sections in the Contract. The Standard Specifications detail what is and is not to be included as excavation and embankment.

Most excavation and embankment items are paid as staked quantities, i.e. the computer generated quantities based on field cross section and slope stakes. Often secondary measurements are taken to modify the original quantities, e.g. when a slope is laid back.

Adjustments to authorized quantities may also be appropriate, if for example the Contractor wastes material which could be used, or uses excavation for rip-rap which necessitates it being replaced by borrow or expanded excavation.

Some quantities are measured in place. For example subexcavation is often inspected as it is excavated and the limits of the excavation determined at that time.

9.4.3.4 Documentation

Generally basic documentation will consist of the computer generated quantities. The computer run should be dated and cross referenced to the Summary Book. Obsolete versions of computer runs should be destroyed or clearly marked as "superseded". Adjustments to the computerized quantities should be

in field books or supplementary computer runs and also cross referenced to the Estimate Book. It should be possible at any time for someone unfamiliar with the project to pick up the Estimate Book and to follow the cross references back to the detailed quantities authorized and accomplished.

9.4.4 Soil Erosion Control

9.4.4.1 Preliminary Review and Approval

Construction activities that are subject to high erosion risk include clearing and grubbing, earthwork, ditch construction, haul roads, culvert installation, channel changes, pier or abutment work in streams, temporary stream crossings, borrow pit operation, and hydraulic or mechanical dredging.

The Contract will contain an erosion control plan that reflects special concerns, measures to protect resources, and permit requirements. The Contractor may submit an alternate plan for approval, but the alternate plan must comply with Contract requirements, constraints and permits. No work on any segment of the project may begin until the required erosion control devices associated with that segment are installed.

Approval of alternate plans should be based on compliance with the requirements and constraints in the Contract, and, if applicable, requirements and constraints in the permit, and in the regulatory requirements of local water quality agency. If the Project Engineer encounters approval/disapproval issues which are not addressed by these documents, the subject should be discussed with the COE.

It is required that the Contractor incorporate all permanent erosion control features into the project at the earliest practicable time. This commitment should be reflected in the proposed progress schedule. If the Contractor subsequently fails to adhere to the schedule and is forced to install additional temporary devices or seeding because the site is not ready for permanent devices or seeding, FLH may take the position that the cost of the additional devices are not compensable under the Contract.

The effectiveness of erosion control should be reviewed and updated prior to any winter shut down or expected erosion potential. Sediment traps, settling basins, stage seeding, mulching, temporary slope drains, special berms, terraces, ditches and/or dikes, temporary seeding, sodding, contouring, benching, serrated slopes, and erosion control mesh may be placed in the construction contract to control soil erosion and stream pollution.

9.4.4.2 Construction Inspection

Prior to beginning each major construction operation phase, the Project Engineer should make a detailed inspection of the project with the Contractor's representative to verify that the approved schedule remains adequate and to go over details not covered in that schedule. Once the devices are installed, additional inspections should also be made periodically to verify the adequacy of the plan.

NPDES permits require inspections at least once per week and after rainfall greater than 10 millimeters. These inspections must be documented and maintained in a separate file. The Contract may require the Contractor to conduct, participate in, and/or document these inspections. Otherwise the Project Engineer is responsible for them.

9.4.4.3 Measurement

Measurement for erosion control devices normally starts with the quantities authorized in the Contract which are based on the specified Erosion Control Plan. If the plan is modified or quantities are adjusted, written authorization for the modifications is required. Once the devices are installed there should be documentation in the IDR's or a field book that each of the authorized installations has been accomplished. If additional quantities, beyond those authorized in the Contract are required, a contract modification may be necessary.

9.4.4.4 Documentation

Basic documentation for erosion control items consists of the following:

- The Contract or alternate approved plan for erosion control devices.
- Documentation/authorization for quantities in excess of those provided in the Contract.
- Inspection documentation that the required devices have been installed and maintained for the duration of need.

The Estimate Book documentation should be cross referenced to these items.

9.4.5 Structural Excavation

9.4.5.1 Preliminary Review and Approval

Excavation for structures is usually bid at prices considerably higher than unclassified excavation. This is largely due to the smaller quantities, difficult access and special foundation preparation and backfill requirements which are included in the bid price for structural excavation. It is the latter requirement which require the most inspection and approval efforts.

9.4.5.2 Construction Inspection

Inspection is required after excavation and foundation preparation has occurred to verify that the foundation materials and their compaction meet the Contract requirements. During backfill, verify that the backfill materials meet contract requirements and that compaction also meets those standards.

Inspection frequency should be random until it is verified that the Contractor is doing a good job controlling the quality process. Inspection frequencies can then be reduced further. Major, critical structures should receive more inspection, especially the approval of the foundation prior to placement of forms for footings.

When backfilling structures, particular attention should be paid to drainage behind such structures. The plan usually require weepholes. The material adjacent to weepholes should be permeable but not erodible. The Contract may require filter fabric to assure separation of coarse rock immediately adjacent to the hole, from finer erodible materials further away.

9.4.5.3 Measurement

Structural excavation is often not included as a bid item and no measurement is performed. When it is included, measurement is usually *as staked*. That is, quantities are computed based on the dimensional limits in the Contract including the elevations of footings regardless of the quantities actually excavated. Sometimes additional excavation is ordered because the foundation does not meet design expectation. These quantities may be ordered to a specific depth - say 200 millimeters, or excavation may be performed under inspection and measured after a suitable foundation is exposed.

If there is no item for structural excavation, then measurement is not an issue. When structural excavation is a pay item, measurement is usually a staked quantity controlled by ground elevation [after unclassified excavation is removed], and vertical planes 450 millimeters from the structure. There is no remeasure of quantities outside those vertical planes, nor is there remeasure of quantities inside the planes not excavated [e.g. adjacent to a footing].

9.4.5.4 Documentation

If structural excavation is a pay item, documentation requirements include original ground elevation, or computed elevations after unclassified excavation is removed if that is appropriate.

Actual computations of structural excavation should be the theoretical volumes below the natural ground or unclassified excavation. These quantities should be verified in the field after being performed. Volumes not excavated should not be paid for, e.g. if the Contractor excavated against natural ground instead of forming. Additional quantities should not be paid for unless the Engineer ordered a footing lowered or expanded.

9.4.6 Watering

Unless otherwise provided in special contract requirements, only that water necessary for dust control is measured for payment. Documentation may be a tally of loads of haul vehicles. This may be maintained by the Contractor, so long as the Project Engineer performs verification at checks at reasonable intervals. The tally of loads should include the time of complete discharge of each load to discourage accidental double counting. The determination of haul vehicle capacity should be witnessed by an FLH inspector. Determination should preferably be by weight if scales are available, or otherwise by meter, or computed volume (least preferred).

9.4.7 Finishing Roadbed

9.4.7.1 Preliminary Review and Approval

On new grading construction, finishing of the roadbed is usually a subsidiary obligation of the Contractor under other items of the Contract. Similarly, on projects providing for a base or surface course on a previously constructed roadbed, the *finishing* or preparation, of the previously constructed roadbed is usually a subsidiary obligation.

When a project includes a section of new grading, plus construction of a base or surface course on a previously graded section as well as on the new work, it is common though not universal practice to include a bid item for *finishing previously constructed roadbed*. This is done for the primary purpose of permitting a Contractor to bid the surfacing items without the necessity of prorating the costs of preparation of the old roadbed. In such cases, payment will be limited to the length of the old roadbed. If no such item is provided, the work is a subsidiary obligation.

9.4.7.2 Construction Inspection

The work required to be performed in accordance with specifications, whether there is a pay item, or the work is subsidiary to other items. Inspection should include surface tolerances, compaction, a visual inspection for soft spots and unsuitable materials.

9.4.7.3 Measurement

Unless there is a pay item for this work, there is no measurement for payment.

9.4.7.4 Documentation

Documentation should verify that each section of roadbed has been inspected, tested if necessary, measured if necessary and accepted prior to construction of subsequent layers.

9.4.8 Aggregate Base and Subbase Courses

9.4.8.1 Preliminary Review and Approval

A. General

Prior to placing base or subbase materials the subgrade must meet grade and template requirements. This can usually be checked well enough with sight levels. Sight levels are especially useful when fine grading stakes have been knocked out. And, they are useful for checking quarter crown and critical superelevation transition sections, whether or not stakes remain.

The subgrade should also be checked for large rocks (over 150 millimeters) in the surface. These will shine or reflect through subsequent aggregate and paving courses placed over them.

The thickness of bases, as shown on the typical sections of the plans, is based on the type of subgrade soil, amount of subgrade stabilization, climatic conditions, traffic, and other factors. Base courses should be placed to the thickness shown on the plans unless subsequent determination indicates a different thickness is required, as might be the case if subgrade material proved significantly different than design expectation. Documentation provided with the design package should indicate the assumption made by the pavement designer. Discuss with the COE. when in doubt as to subgrade adequacy.

The Contractor's QC personnel should develop a spread rate for the aggregate course prior to starting the spreading operation. The spread rate converts the tonnage of each truck to the number of meters along centerline which that tonnage should cover. These computations should be checked by the Engineer. The spread rate should be based on the wet density at two percent or so above minimum density.

Example:

Maximum Density (Dry) - 2160 kg/m³

Optimum Moisture - 8.0%

Maximum Density (Wet) - 2333 kg/m³

Target Density (97%) - 2263 kg/m³

Spread Depth - 150 mm Bottom Width - 9.2 m Top Width - 8.0 m

Area - 1.29 m²

Spread Factor - 2263 × 1.29 = 2919 kg/m

So a truck with a 30,000 kg net load would cover a spread of 10.28 meters.

Once laydown has started, the Contractor should perform depth checks and width measurements in order to verify the computed spread rate. When the operation is fine tuned to the point that plan dimensions are being achieved, the Project Engineer must consider yield. It is necessary to calculate as early as possible how well the yield, in say stations per metric ton, will match the contract quantity for the item, if the entire course is completed at the same rate. This information will bear on questions of project funding adequacy, materials source capacity, and any necessity to negotiate relative to significant variation from plan quantity.

B. Materials

It is the responsibility of the Project Engineer to see that required samples are taken and tested in accordance with the specifications. This applies whether the sampling and testing is to be performed by the Government or the Contractor.

(1). Preliminary Sampling and Testing

Laboratory tests for a source approval determination of quality will be made before base or surface course material is produced or shipped. Where the source proposed for use has not been previously explored, tested, and approved, it is the responsibility of the Project Engineer to coordinate the approval process. The Construction Operations Engineer, as well as Division materials specialists, etc. will usually be involved in the approval decision. If the source has been proposed by the Contractor, the specifications may require submission of exploration and

test data. The Construction Operations Engineer will advise the Project Engineer on the status of the Contractor's submission, and how any approval letter is to be written when the decision is made.

(2). Sampling and Testing by the Contractor.

Whether or not contractor testing is specified, it is the responsibility of the Contractor to effectively control the quality and contract compliance of the material being produced. The specifications include requirements for a contractor inspection system, pursuant to Federal Acquisition Regulations.

It is to the mutual advantage of the Contractor and the Government that the product comply with the specifications at the time of production. However, in the event of deficiencies, blending of filler and other adjustments by the Contractor prior to final mixing and blending may correct those deficiencies. Conversely, material which is found to comply with specifications at the time of sampling at the crusher may be degraded during further handling so that it fails when tested for acceptance.

While base and subbase specifications are for the most part end result type, the Contract will often specify proper handling and storage of materials. Therefore, if the Project Engineer comes to believe a Contractor's handling and storage processes will result in quality problems, there is contractual basis for requiring process improvements. The Construction Operations Engineer should be consulted if there is disagreement with the Contractor.

(3). Sampling and Testing for Acceptance

Gradation, liquid limit, plastic limit, plasticity index, moisture and density, and other job control sampling and testing required by the specifications will typically be performed in the field. The Contractor is usually responsible for establishing specification target values. For stockpiled materials, the computed composite gradation is most often proposed as the target.

There are at least three methods of adding water and mixing aggregate materials. Regardless of the method used the aggregates will be tested for acceptance based on samples taken from the windrow or roadway after final blending and prior to compaction. The frequency of samples and tests can be determined from the Contract specifications and/or the FLH Field Materials Manual.

9.4.8.2 Construction Inspection

A. Inspection Intensity

The inspection of a high production base or subbase operation will usually require the full attention of one competent inspector even if personnel furnished by the Contractor are testing, weighing, and recording the receipt of materials on the grade. This inspector will be busy verifying the work of the Contractor personnel, designating and monitoring samples and inspecting subgrade ahead, in addition to verifying dimensions of materials placed, keeping complete records of Contractor equipment and personnel usage, and consulting with the Contractor and Project Engineer.

If Government personnel are testing compaction, or are receiving materials, these personnel will be able to relieve the inspector of part of the duties described above, perhaps to the point the inspector can monitor some other project operation also.

B. Mixing with Water

The Contractor may mix the base course by the stationary plant method, the travel plant method, or the road mix method. When the Contractor elects to use the road mix method, special attention should be given to the following:

- That excess water is not added in such a manner that the subgrade bearing capacity is detrimentally affected.
- That water is added uniformly and not in a manner which might promote segregation.

If the Contractor uses a stationary pugmill plant and storage hopper, it may be necessary to baffle the flow into the hopper to reduce segregation of the aggregates.

C. Compacting

The moisture density relationship for base and subbase materials is commonly determined in a central laboratory but a field laboratory can usually perform the tests if time is short. The laboratory requires a sample of the aggregate, and knowledge of the Contractor's target values. The laboratory usually requires some time for the determination. Aggregates with moisture in the range indicated below can usually be compacted with usual effort.

The Project Engineer should require sufficient moisture determinations of the base course material to assure proper compaction. With the typical material, this moisture content will be between 5 and 8 percent at the time of compaction. The amount necessary will vary with the specific gravity, surface texture, and grading of the aggregate. Preliminary tests made in the Division or other designated laboratory will show the percentage of moisture necessary for proper compaction and maximum dry density. It is essential that the proper amount of water be uniformly mixed with the aggregate before spreading and compaction is started. Base course must be rolled sufficiently and with such weight and type of roller as will assure specified compaction. Excess water will cause flushing of fines to the surface under compaction. Rolling should be stopped in such cases until the excess water is removed, or allowed to run off and evaporate. Water draining from haul vehicles is usually a sign of excessive water in the mixture.

D. Stockpiling Aggregates.

The Contractor may elect to stockpile base course aggregate prior to placement. However since testing for acceptance does not take place until placement, this is frequently a situation where a Contractor may initially test the material and document compliance but is later unable to meet gradation requirements.

With or without observing proper stockpiling techniques, the Contractor is responsible for providing aggregate which meets the specified grading requirements upon incorporation into the project. However, compliance with specified handling and storage requirements might mean an overall pay factor of 1.0, as opposed to say 0.75 if proper procedures are not followed.

9.4.8.3 Measurement

The method of measurement will be in accordance with the Contract. If the measurement is by the metric ton, the scales must meet the requirements of the specifications. Project Engineers should not confuse checks of contractor weighing, with checking the scales. One is a personal integrity issue, the other relates to equipment.

9.4.8.4 Documentation

The area of documentation is one which is closely scrutinized by internal and external reviews, and deserves the Project Engineer's careful attention.

Delivery records should be checked against weigh records to verify that material weighed was incorporated into the project. As a minimum the number of loads invoiced should be checked against the number of loads delivered every day. Spot checks of actual tickets against the invoice summary should also be performed routinely.

Weight and delivery records, as described for bituminous mixes in Section 9.4.10, are also suitable for this work. When the specifications stipulate Contractor weighing, the Project Engineer should periodically verify weights recorded. For platform scales, this is accomplished by taking a truck weighed under normal circumstances and circulating that truck back across the scales and reweighing the vehicle in the presence of an FLH inspector.

This verification process is to be documented in the permanent weigh records. Verification loads are to be selected so as to preclude knowledge or anticipation by Contractor personnel. The Project Engineer and Contractor should have a documented understanding of acceptable tolerances, and what is to be done if they are exceeded. The recommended tolerance for a single check is 50 kg, but the average of several checks should be 15 kg or less. If there is evidence of biased or erratic weighing, the COE should be consulted. The Government may want to consider requiring the removal of the weigh person, and/or applying a correction factor to all invoiced weights.

For belt-scale weighing, a previously weighed truck should also be periodically directed to a properly certified platform scale. This verification should be documented in the permanent scale records. In rural areas this may require a long trip to find such a scale.

In all cases if the Contractor has an English unit scale which otherwise meets Contract requirements, there is no requirement to provide a metric scale if invoices and other documentation are submitted in metric units.

Occasionally it may be necessary to haul material by the cubic meter when measurement is specified by the metric ton. The Project Engineer should keep this type of variation from the specified measurement to a minimum. Where such variation is approved, the Contractor should be required to establish the metric ton per cubic meter ratio by weighing a load of known volume on certified scales. This documentation along with truck volume measurements should become a part of the permanent record.

When the specifications stipulate volumetric measurement in the hauling vehicle, the Project Engineer should verify the measurement of the volume to be hauled by each hauling vehicle. In certain instances, it may be necessary to haul less than the capacity of the truck. When this occurs, the volume being hauled and documented should be accompanied by a written agreement between the Government and Contractor as to the volume to be paid per hauling vehicle.

9.4.9 Dust Palliatives

9.4.9.1 Preliminary Review and Approval

Review the Contractor's plan for controlling traffic during application and curing. Review supplier certifications to insure that the specified palliative is being provided.

9.4.9.2 Construction Inspection

The roadbed to be treated should be brought to the proper template and compacted. Just prior to treatment, the surface should be dampened. Application rates should be determined and equipment calibrated. Runoff is to be avoided, particularly in the vicinity of lakes and streams.

9.4.9.3 Measurement

Dust palliative materials are paid by the metric ton. If materials are not used the Contractor should be requested to document the quantities involved and to remove them from the project without payment. However, if the Contractor makes a convincing argument that such materials are not returnable and have no further value, the Project Engineer may have to consider paying for all or part of the leftover quantities and ordering them removed under a Contract Modification. For this reason it is important to plan quantities carefully and communicate with the Contractor as to what will be needed and what will happen to leftovers.

Application of dust palliatives will be paid separately by the square meter, or by the station. The Project Engineer or Inspector should reach agreement with the Contractor on the quantities involved in each application.

9.4.9.4 Documentation

Required documentation includes certifications or other acceptable quality documentation.

Invoices or weigh ticket should be submitted to document quantity of materials. Daily records of applications should be included in a field book to document that item.

9.4.10 Hot Asphalt Concrete Pavement

9.4.10.1 Preliminary Review and Approval

The contract defines the Contractor's responsibility with respect to the production and placement of asphalt mixes. It behooves the Project Engineer to also be prepared with knowledge of proper construction procedures.

As a part of the Quality Control Plan approval process the Contractor's process control procedures should be reviewed both from a procedural standpoint and from a quantitative view. Equipment, screens, scales etc., should be inspected and the test methods examined. Care must be taken to insure that the Contractor testing personnel do not construe the approval of QC equipment and methods as acceptance of the material produced.

The Project Engineer should insure that the mix design samples are adequate in size, representative of the material being produced, and that they are submitted as soon as reasonably possible. The shipment of the asphalt and antistrip agent samples should be coordinated through the suppliers, and the central laboratory notified of their impending arrival.

After the mix design is completed, the Project Engineer should review and compare it with the design criteria to understand the approval process/criteria. The Project Engineer should make certain that the Contractor understands that the asphalt cement content used in FLH mixes is a percentage of the total mix, not a percentage of the dry aggregate.

Before production of the mix begins, the statistical evaluation procedures should be thoroughly discussed with the plant personnel and any problems or questions concerning the procedures resolved before conflicts arise.

Prior to the commencement of paving operations, it is desirable for the Project Engineer and the Contractor to get together for a pre-paving conference. This is an opportunity for both parties to familiarize themselves with the contract requirements and share their plans for proceeding with paving operations. This goes a long way toward minimizing surprises during paving and promotes good working relations.

2. Construction Inspection

A. Plant Operations

(1) General

There are, in general, two types of plant operations: (1) the permanently located commercial plant with multiple production operations; and (2) the portable plant, erected on or near the project to produce solely for the project.

The inspection and quality control of asphalt plant operations is typically a Contractor or producer responsibility and covered in the Contractor QC plan. The Project Engineer may ask for documentation and verification that this QC process is effective and may perform verification inspections. Generally FLH oversight of Contractor QC is less necessary at commercial plants.

At the commercial plant site, or as soon as the portable plant is set up and ready to operate, the Contractor QC specialist should make a thorough examination of the plant layout, including storage areas and component parts of the equipment. If the storage areas or any part of the equipment fails to comply with the requirements, corrective measures must be taken before operations begin.

There are two general types of asphalt concrete mixing plants: the batch plant and the continuous mixing plant. Continuous mixing plants include pugmill mixing plants (very rare) and dryer drum plants. In the batch plant, the aggregates are proportioned by weight and the bituminous material proportioned by weight or volume. In the continuous plants, the aggregates and bituminous materials are proportioned by volume based correlated to weight; or in the case of the dryer drum plant, provided with positive weight measurement (belt scales) to allow regulation of the feed gates and permit automatic correction for variations in load.

(2) Inspection of Plant Equipment

(a) **Pugmill Mixer.** In order to properly understand the asphalt plant, it is necessary to become thoroughly familiar with the specification requirements and with the particular type of equipment being used. The components of a batch plant and continuous mix plant utilizing a pugmill for mixing are essentially the same. The main difference is the method used to proportion the components into the pugmill mixer. The dryer drum mixer uses an entirely different concept for mixing the aggregates and bitumen and will be discussed separately. As an additional aid for plant inspections, the functions of the most important components of the batch and continuous bituminous plants and some of the factors to be considered during the inspection are discussed below.

- **Bituminous Storage Tanks.** Storage tanks must be of sufficient capacity to maintain continuous operation while allowing for delay in asphalt shipments. They must be equipped with heating devices and must be able to hold the material at the required temperatures.

Storage tanks must be inspected by Contractor or producer QC personnel to see that they are free of foreign material and any bituminous material other than that to be used in the mix. They must also not admit water, fuel oil or other foreign substances. Steam coils used for heating should be checked for leaks before any asphalt is unloaded and again when the material is first heated. The asphalt cement lines and fittings must be adequate to provide proper circulation between the storage tanks and the plant. All pipes and fittings should be steam or oil-jacketed or otherwise insulated to prevent heat loss.

- **Cold Aggregate Feeder.** The cold aggregate feeder used with a portable plant is generally equipped with four bins, adjustable gates, reciprocating feeders and an endless belt to carry the proportioned aggregate to the dryer elevator. A commercial plant is generally equipped with separate bins, adjustable gates and a tunnel and conveyor system. In either system, the gates must be adjusted so that the aggregates, in the proper amount and size, are delivered to the plant to maintain uniform production.
- **Dryer.** From the cold feeder the aggregate is elevated to the dryer where it is heated and dried to the required temperature and moisture content. The component parts of the dryer are: (1) a revolving cylinder, usually from 1 to 3 meters in diameter, and from 6 to 12 meters long; (2) a burner which is either gas or oil fired; and (3) a fan which may be considered part of the dust collector system, but its primary function is to provide the draft air for combustion in the cylinder. The cylinder is equipped with longitudinal cups or channels, called lifting flights which lift the aggregate and drop it in veils through the burner flame and hot gases. The slope of the cylinder, its speed of rotation, diameter, length, and the number of flights, control the length of time required for the aggregate to pass through the dryer.

The aggregate passes from the dryer to the hot elevator through a discharge chute near the burner end of the dryer. The sensing element of a thermometric instrument should be located in this discharge chute to record or indicate the temperature of the aggregate as it passes from the dryer.

Dryers must heat the aggregate uniformly. To prevent coating the aggregate with fuel oil, the burners and draft must be adequate for total combustion of the fuel. Because of possible damage to the bituminous materials, the heating system should be checked to make certain that overheating of the aggregates is avoided.

- **Dust Collector.** All plants are required to be equipped with dust collectors. This is necessary to reduce air pollution and to return dust to the hot elevator when needed to meet aggregate grading requirements.

In operation, a fan exhausts the draft air from the upper end of the dryer into the dust collector system. This draft air, containing dust particles, vapor, and gases enters the dust collector at the upper periphery and goes upward. The heavier dust particles are separated by centrifugal force into the collector shell and fall to the bottom. The

heavier dust will be reintroduced into the flow of aggregate or wasted as required by the specifications or grading requirements.

To comply with established air pollution limitations, the use of a scrubber or other suitable device to practically eliminate dust particles from the exhaust air of bituminous plants is sometimes required. The Contractor is to comply with all Federal, State, and local laws and ordinances. The more stringent rules normally apply.

- **Hot Elevators.** Hot elevators must be protected so as to prevent chilling of the aggregate or the blowing away of fines.
- **Screening Unit.** The heated aggregates are elevated, usually by a bucket elevator, to a screening unit, which separates the aggregate into the required number of size fractions and deposits the various sizes into the graded aggregate bins. The screening unit on most plants is the flat table vibrating type, usually equipped with four decks. The size of the screens on the decks varies with the type of bituminous mixture to be produced. The top deck is covered with a scalping screen which removes all oversize material and discharges this material into a reject chute.

Screens should be examined and a record made of their dimensions, length, size, and rotation or vibrating speed. They should not clog nor overflow during normal operations. Holes or breaks in a screen should be repaired promptly.

- **Hot Aggregate Bins.** These bins hold the heated and screened aggregates in various size fractions required for the type of mixture being produced. The bottom of each bin is fitted with a discharge gate which can be operated manually or automatically. Each bin must be equipped with an adequate overflow pipe.

Inspection of the bins should include an examination of the partitions to see that they are tight, free of holes, and of sufficient height to prevent the intermingling of aggregate sizes. The closure of discharge gates must be positive enough to prevent leakage into the weigh box. Other leakage from bins and the accumulation of aggregates in the corners or elsewhere is to be avoided.

- **Scales (Batch Plants).** On batch plants, a weigh hopper for the aggregates is located directly under the graded aggregate bins. The weigh hopper is suspended on the weighing mechanism, generally equipped with a springless dial scale on which the weight of aggregate from each bin is marked accumulatively so that the last mark will read the total amount of aggregate in each batch. The hopper must be large enough to hold the batch of dry aggregate without overflowing or reaching the bin gates.

The bituminous material can be weighed in a special bucket or can be measured by a meter for each batch.

The scales are required to be inspected and sealed. When the plant is ready to operate, the scales should be cleaned and each part carefully checked. It is imperative that the bitumen scales and the aggregate scales be checked daily. The indicating heads must be functioning properly, that is, balanced with the dial at zero. The scale levers and knife edges must move freely. If the weigh hopper is rubbing against some part of the plant or is being supported by one of the structural members, the indicated weight of the material in that hopper will be incorrect.

- **Graded Aggregate Bin Control Gates (continuous plants).** Up to the point of discharge from the graded aggregate bins, the function of the continuous mix plant and the batch plant are essentially the same. In continuous mixing plants, the proportioning of the separate sizes of aggregate is accomplished through the adjustable gates on the feeder of the gradation unit which deposits the aggregates onto the elevator to be delivered to the pugmill. The asphalt cement is delivered to the pugmill through a calibrated metering pump. The aggregate feeder and the asphalt cement pump are generally geared to a common power source to assure that

proportions of aggregate and the bituminous material remain constant, regardless of variations in the power supply. Before production begins, calibration of the flow of aggregates from each feeder gate must be made.

- **Pugmill Mixer.** After proportioning, the aggregate and the asphalt cement are introduced into the pugmill for mixing. The asphalt plant is equipped with a pugmill mixer, which consists of twin shafts equipped with paddles for mixing the ingredients into a homogeneous mass. Efficient mixing is dependent upon the number and shape of the paddle tips, speed of the mixing shafts, length of mixing time, temperature of the materials, quantity of materials in the mixer, and the clearance between the paddle tips and the liner plates. The mixers of batch mix plants and continuous plants are essentially of the same design, except for the variation in arranging the paddle tips.

In the batch plant mixer the materials are dumped into the center of the mixer and paddle tips are arranged to give an end to center mixing or a run-around (figure eight) mixing pattern. The material is held in the mixer for the required mixing time and then discharged through the discharge gate into the transporting vehicles or storage hopper. The mixer must be equipped with an automatic timing device to automatically regulate the dry-mixing and wet-mixing periods, and a batch counter to accurately record the number of batches produced.

In a continuous mix pugmill the materials are introduced in one end of the mixer and the paddle tips are set to transport the materials to the discharge end as the mixing is accomplished. The mixing pressure varies with the height or weight of material in the pugmill, which can be controlled by: (1) raising the dam on the discharge end of the mixer to hold the material in the mixing unit for a longer period of time at a depth that will intensify the mixing action; and (2) adjusting or reversing the pitch of the paddles to retard movement of material through the pugmill.

Linings, sides, bottoms, and gates of the mixer should be inspected to see that there are no leaks. Paddle tips and/or liner plates must be replaced or adjusted when they show excessive wear or when clearance exceeds the specified amount.

(b) Dryer Drum Mixers

In dryer drum mixers the aggregate is coated with the asphalt by spraying asphalt into the veil of aggregate during the drying process as opposed to the mechanical mixing of a pugmill in the batch plant. The most important components of the dryer drum plants and some of the factors to be considered during the inspection are discussed below.

- **Cold Aggregate Feeder.** The cold aggregate feeder is basically the same as that used with a batch type plant discussed above with the exception that the main belt feeding the dryer is equipped with a weigh bridge, which is used to monitor the amount of aggregate being fed into the plant at any given time. This weigh bridge is interconnected with the asphalt pump so that the required amount of asphalt is added for the mix. Weights obtained from the weigh bridge include moisture in the aggregates which must be taken into account to arrive at the dry weight of aggregate. Since dryer drum plants do not have screening units and hot aggregate bins, it is very important that the stockpiled aggregates be of the proper grading, are not segregated, and that the gate openings on the cold feeders are properly calibrated for the mix design.
- **Dryer.** The dryer in this type plant not only heats and dries the aggregate, but is also the mixing chamber for the asphalt and aggregate. The aggregate enters the drum at the burner end and is lifted by the flights and veiled through, and in front of the flame, thus protecting the asphalt from direct flame contact. Newer dryer drum plants are equipped with a flame shield to protect the asphalt from the flame, but even with these plants good veiling of the aggregate is also necessary. In order to assure a good veil of aggregate, the plant must be operated within the capacity range recommended by the manufacturer. The asphalt is introduced into the middle one-

third of the drum through a spray pipe. Moisture being driven off the aggregate reacts with the asphalt, causing it to foam and thus facilitates the coating of the aggregate.

- **Dust Collector.** Dust collectors on a dryer drum plant are the same as for batch plants as discussed above.
- **Storage Silo.** Since a dryer drum is a continuous operation, the asphalt mixture is transported from the drum by a hot elevator to a storage silo. The silo should be of sufficient size to allow continuous operation of the plant and should be insulated to prevent temperature drop in the mix during storage. Silos should be designed so that segregation of the mixture will be minimized during charging. This is accomplished by using a rotating chute, batcher, or ladder.
- **Controls.** Modern plants are fully automated with control panels that can furnish a variety of data pertaining to the plant operation. The inspector should become familiar with the data output available for the plant to be used.

(3) Calibration of Plants. It is not intended that FLH personnel take the lead in the calibration of plants. Commercial plants approved by a State highway agency should not have to be recalibrated for FLH mixes provided documentation of their calibration and accuracy is available. For portable plants, calibration should be a part of the Contractor's QC Plan and subject to the review of the Project Engineer.

The scales (both aggregate and asphalt on batch plants, and the apron feeders and asphalt on continuous plants) should be calibrated before production is started. General information and/or suggestions for consideration by the Engineer are as follows:

(a) Batch Plants. The specifications require that noncommercial (project) plant scales be inspected, tested, and sealed after relocation but not less than once per year. Commercial plant scales must be sealed in accordance with acceptable local/industry practice. However, portable plants may be used for a reasonable period of time prior to sealing, providing field testing indicates compliance with the accuracy specified.

For batch plant scales, field testing may be performed as follows: Asphalt and aggregate hoppers should first be balanced with the dial or beam reading zero, making sure that all weighing equipment operates freely. Accuracy of the scales should then be checked at various points within the anticipated operating range, using standard weights required to be furnished by the Contractor. Since it is not required that the Contractor have sufficient standard weights to reach full capacity of the aggregate hopper, the maximum number of weights available should first be placed in the hopper and the weigh beam balanced or the dial read. The weights should then be removed and aggregate dumped in the hopper to bring the beam back to balance or to give the same reading on the dial. The standard weights should again be placed in the hopper and a new balancing or reading obtained. The operation of adding weights, balancing, and replacing weights by an equivalent amount of aggregate is then repeated until the full capacity of the hopper is reached.

(b) Continuous Plants. Continuous plants use a positive displacement asphalt pump. Discharge is measured through a meter similar in operation to the ordinary water meter. Rate of discharge is varied either by an adjustment on the pump or by changing the sprocket drive combination. The pump may be calibrated at different rates of discharge by taking initial and final meter readings for a measured length of time. This should be done with the specified grade of asphalt brought to the required temperature and after the pump has been run long enough to eliminate all air from the lines and for the pump to reach operating temperature.

The asphalt meter may be checked from time to time by comparing the difference in meter readings with the known amounts of asphalt that have been run through the plant. These known amounts may be obtained from the weights of asphalt delivered to the job or by asphalt storage tank measurements using the appropriate calibration curves.

Proportioning of aggregates in a continuous plant is by volume rather than by weight as in the batch plant. Calibration involves converting these volumes to weights. Discharge from the different bins is obtained by varying the rate of discharge by adjustments of a gate over an apron feeder. Continuous plants are normally equipped with gates for simultaneously diverting the discharge from its normal path to the pugmill to sampling cans - one can for each bin. The amount of aggregate discharged into each can for a given number of shaft revolutions and at various gate openings is weighed. From this data, calibration charts can be prepared which will show the proportionate rate of discharge for each particular type and grading of aggregate used in the calibration. The aggregate for calibration should be dried and screened in the same manner as will be used during construction. In other words, a "dry run" will be made with aggregate fed to the dryer, with dryer screens operated the same manner as for actual plant-mix production. Calibration will normally start with the gate openings set at about 50 millimeters and then graduated to openings corresponding with the maximum capacity of the plant.

To facilitate calibration, the Contractor should have available a copy of the manufacturer's operating instructions, which will show the operating speed of the feeder and the asphalt pump delivery rate for the various sprocket sizes. The sprocket size for the asphalt pump must be checked, for the delivery rate required, by weighing the amount of material pumped into a container over a carefully timed interval.

(c) Dryer Drum Plant. Calibration of a dryer drum plant consists of setting the cold feeder gates for each aggregate size and setting the asphalt pump for the proper asphalt content. The pump should be set for the desired percent asphalt based on rate of the aggregate feed as determined from the cold feed weigh bridge, remembering that the percent moisture in the aggregate must be deducted from the cold feed weight.

(4) Inspection of Plant Operations.

(a) General. With today's fully automated hot plants, it is not often that the plant is found to be the cause for construction of poor quality hot asphalt concrete pavements. The plant QC specialist should be familiar with the operation of the plant, and be able to monitor gate openings, scale settings, timer settings and temperature controls. Such things as screening units, bins, mixers and overflow vents should be checked to assure they are functioning properly.

End result specifications place the responsibility for quality control with the Contractor. The Project Engineer should be familiar with the Contractor's quality control plan and monitor the results for any indication of change which could be expected to affect the quality of the work being produced. It is important that FLH personnel and the Contractor cooperate fully in order to produce a high quality, acceptable paving material.

During production, the QC specialist should make periodic checks of:

- Cold feeder gates and overflow vents for any overflow of the graded aggregate bins
- Temperature of aggregates, bituminous material, and mixture
- Proper dryer operation
- Weighing and mixing operations; and
- Mixture in trucks for uniformity in appearance.

The Project Engineer should see that the haul tickets are properly made out and issued for each truckload of mixture delivered, and must see that the daily totals are promptly obtained, checked, entered on the daily report, and made a part of the permanent project records.

(b) Operation of Cold Feeders. The first and most important aggregate proportioning is done at the cold feeders. To provide the proper flow of the right sizes of aggregates, the proper sizes of aggregate must be in the stockpiles and kept from

segregating and intermixing, and the feeder gates must be kept adjusted and free from obstruction. Enough material must be maintained in all bins to provide a positive and uniform flow.

Plant QC should include observation of the equipment feeding the plant from the stockpiles and be sure that the material is uniform when it is fed to the dryer unit. Segregated aggregates fed through the dryer will result in uneven drying and heating which, in turn, result in nonuniform screening and ultimately in a nonuniform mix.

The specifications will normally require that the materials be separated into a minimum of two stockpiles. One pile will normally contain that fraction retained on a 4.75 mm sieve, and that the other fraction passes the 4.75 mm sieve. The cold feed bin must be so constructed so that there is no intermingling of the two sizes of material.

(c) Screens and Bins. The size and relative amount of fine aggregate controls the voids in the mix, which in turn controls the proper proportion of asphalt in the mix. Every effort should be made to hold the grading uniform. Segregation occurring in the fine-aggregate bin can be corrected by properly placed combining chutes and baffles.

The coarse aggregate bin should be inspected occasionally for a carryover of the fine material. Carryover can be corrected by installing a section of larger-opening screen, reducing the rate at which the material passes over the screen, or changing the length, diameter, pitch or speed of the screen. The presence of more than 5 percent of smaller sized material in any bin, is an indication that excessive carryover is occurring and screens are either clogged or overloaded.

Sampling of aggregates prior to mixing with bituminous material may most conveniently be made of the dried and screened aggregates in the different bins. Most plants, either of the batch or continuous types, are equipped with sampling trays that make sampling from each bin quite easy.

(d) Checking of Asphalt Content. Probably the most common cause of failure in asphalt paving mixtures is the incorrect asphalt content. Incorrect asphalt content can be caused by inaccurate scales (asphalt and/or aggregate), variation in aggregate grading, absorptive qualities of aggregates used, or poor interpretation of preliminary test results. Attention must be paid to the lever systems of the scales on the mixing plant to be sure they are functioning properly.

(e) Mixing. The method of charging the mixer, which gives a homogeneous mixture in the least possible time, is the desired method to adopt for the job. The most commonly used method of charging is by dropping the weighed batch into the mixer and thoroughly mixing dry for a period of a few seconds before adding the asphalt.

The mixer should produce a uniform distribution of asphalt throughout its length. The introduction of the asphalt by means of a spray bar over the entire length of the mixer aids in obtaining uniform distribution.

Temperature of the aggregate has a marked effect on the mixture. If the aggregate is too cold, a nonuniform distribution of asphalt through the mixture will result. If too hot, the aggregate will cause excessive hardening of the asphalt and will result in a too thin coating on the coarse aggregate with a corresponding excess of asphalt in the fine aggregate portion.

The requirements for limiting the temperature of the aggregates are in the specifications. The temperature can be measured most conveniently on the mixture immediately after discharge from the plant.

During the actual mixing process the QC process should include frequent observation of the operations from the mixing platform with notation of the care used by the operator in weighing each size of aggregate and the asphalt; the time interval for mixing the dry aggregate; whether or not the asphalt bucket is well drained; and the time of mixing the asphalt and aggregate. The inspector should also note the action of the mixture in the mixer box to determine uniformity of mixing and the tendency toward segregation. The

movement of the mixture is controlled by the position of the mixer blades. Variations in uniformity can usually be eliminated by changing the position of the blades. This must be done by trial. When the blades are satisfactorily set, they seldom need further attention.

Attention should also be given to the mixer-box to see (1) that the liners and blades are so set that all of the material will be incorporated into the mixture and that none lies in the bottom of the box to be dropped out eventually as an unmixed or partially mixed combination, and (2) that the discharge gate of the mixer box is neither unduly worn nor improperly seated. Its condition can usually be determined by observing the bottom of the box from the time the dry aggregate is introduced until the completed mixture is dropped. If a thin stream of dust and fine aggregate sifts from the gate during the dry-mix period, or a rich mixture of asphalt and fine aggregate seeps through during the wetmix period, this indicates that the gate does not fit tightly. If, as the gate opens to discharge the mixture, a stream of dry, uncoated aggregate appears first, there is indication that the gate lining is worn, or the mixer blades are not picking up the aggregate. In either case, the Contractor should take the necessary action to eliminate the problem. No useful purpose is served by accurately preparing and weighing the components of the mixture if they are not combined properly. A satisfactory mix is of uniform coating and appearance, free from segregated areas or heavy smoking. No more mixing should be employed than is necessary to completely and uniformly coat the coarse aggregate. The manufacturer's rated capacity should not be exceeded, nor should the minimum specified mixing time be underrun.

Mixers should be cleaned daily with hot dry aggregate and with hand tools if necessary. The cleaning should not be so thorough, however, as to polish the mixer sides. This may occur with the hot dry aggregate cleaning. Cleaning with oil should not be permitted.

Where continuous mixers with volumetric proportioning devices are used, the QC process should include a check of the accuracy of the proportioning devices and require any necessary adjustments before production of the mixture is begun. The Contractor should have available descriptive literature and instructions published by the plant manufacturer for the particular plant being used in order to facilitate the checking of adjustments of the equipment.

During the operation of drum mixer plants, the inspector should review and observe operating data of the control panel and should inspect the stockpiles and cold feed for segregation and quality. Aggregate, mixture and asphalt temperatures should be checked periodically. Any deficiencies found should be pointed out to the Contractor and corrective measures taken.

B. Road Operations

(1) General. It is the responsibility of the Project Engineer or the paving inspector to verify that the paving operations are performed in accordance with the contract. They must be thoroughly familiar with the plans and specifications, the Contractor's plan of operations, necessary traffic control procedures, and construction equipment to be used.

Prior to paving operations, the paving inspector should thoroughly check the surface on which the pavement is to be placed. The surface should be checked for correct grade and template and all damaged areas, depressions or potholes repaired to give a firm and unyielding paving base. If the surface is a base or subgrade, a prime coat is often required. If so, it must be thoroughly cured. When an existing pavement is to be resurfaced, the surface must be cleaned of dirt and other extraneous matter and all weak areas repaired. If a leveling course is to be applied, the existing surface should be checked and the roughest areas marked to receive that course. A tack coat, when required, should be applied to paved surfaces. The tack coat should be applied to the width and length required for not more than the day's operation.

For prime and tack coats Contractor QC personnel should document that equipment including meters is in proper repair and the coverage rates are properly calculated and applied.

The pavement edges should be marked by stringline or paving guideline sufficiently in advance to assure continuity in the paving. These should be set and nailed to the surface at intervals that

will permit the line to be held taut, and checked to be sure that the required pavement width is secured. When necessary, an electronic sensor line is set rigidly supported to the required grade.

(2) Inspection of Paving Equipment. The paving inspector should make an inspection of the Contractor's paving equipment, checking the condition and adjustment of the component parts of the laydown machine and rollers. This equipment should have already been subject to the Contractor's QC process. Therefore if deficiencies are noted the Contractor should be advised to modify that process. By making this inspection prior to beginning paving operations, obvious deficiencies in the condition of the equipment may be discovered and corrected, thus avoiding delays once the work is underway and assuring that the best possible surface is obtained.

Listed below are some of the more important details the inspector should check during the inspection of the paving equipment.

(a) Paving Machines. The inspector should become familiar with the mechanical features of the paver to be used on the project, so that an intelligent appraisal of the condition and adjustment of the machine may be made. Operating details and instructions for adjustments are contained in the manufacturers' handbooks. These handbooks should be available to Contractor QC personnel as well as the Engineer and inspectors. The Contractor QC person should check the general features listed below before starting paving operations:

- On all paving machines the operating motor should be checked for proper governor operation and vibration at operating speeds.
- On track mounted machines, track linkage must be correctly adjusted and checked for excessive wear.
- On pneumatic-tired machines, all tires should be inflated to the recommended pressures, and the drive chains checked for correct adjustment and for excessive wear.
- The screed should be free from excessive play, and have the correct adjustment for crown and tilt.
- Check screed plates for excessive wear, and screed heating burner's operating efficiency. Screed extensions must be in the same true plane and flush with the screed bottom. Check vibrators on the vibrating screed for proper operation.
- Automatic grade or thickness control, should be checked for proper operation with ski or other device(s) as required.

(b) Rollers. Check steel-wheel rollers to see that the wheels are capable of rolling in a true plane and are free from flat spots or ridges. The steering and driving mechanism must be free of excessive play or backlash; and the motor and driving transmission free of oil leaks. The rollers must have scrapers for keeping the rollers clean and wetting pads to keep the rollers wet so they do not pick up asphalt during the rolling operation. Water and a wetting agent should be used, not a petroleum based product.

With the widespread use of vibratory rollers for compaction at asphalt mixtures, the laydown inspector should become familiar with their operation. A variety of information is available covering the use of vibratory rollers and the effects of vibratory compaction variables such as frequency, amplitude, mixture and construction parameters such as gradation, aggregate characteristics, type and amount of asphalt, environmental conditions, lift thickness and type of base. The inspector should become familiar with the rollers to be used and the adjustments that can be made to control frequency and amplitude. The adjustment of these two variables can have a marked effect on the compaction of the mixture. Roller operators have a tendency to "set it and forget it," so the QC process should require frequent verification that settings are correct.

(3) Spreading and Finishing. The specifications require the use of an asphalt paver for spreading and finishing the mixture. In irregular areas the mixture may be spread and finished by other suitable tools or equipment.

The paving inspector's routine duties are to collect load tickets from the Contractor's laydown foreman, and to verify that they are complete and that depths and spread distances are being controlled effectively. At the end of the day the inspector must sign a daily weight record attesting to the acceptance of the total weight. The inspector's principal duty is to assure construction of a pavement to the correct grade and template as set forth in the plans, and with a surface texture and riding surface as required by the Contract.

To achieve these results, the inspector must monitor the Contractor's QC process and periodically check the surface to be paved, the mixture in the trucks, surface texture behind the machine, rolling operations, and paved surface with a straight-edge or string line for the proper crown and smoothness.

When ready to start paving operations, the screed should be heated to the proper temperature and the grade controls set to construct the transverse joint. This must be carefully checked to insure good riding qualities and conformity with the tolerance requirements before the paver is allowed to proceed. Particular care should be exercised in setting the thickness control device to assure attainment of the spread and crown desired. When matching the edge of a previously laid section of pavement, the paver screed should overlap the existing edge from 25 to 50 millimeters and the thickness controls should be adjusted to leave the material slightly higher than the previously laid section of pavement. Overlapping this edge will force enough material into this area to insure that the joint is completely filled and moisture proof. The height of the material above the previously laid edge should be adjusted so that when the longitudinal joint is properly compacted, the pavement will be uniform in cross section and within the tolerances specified.

The use of any hauling unit with a frame that comes into contact with the paving machine or which bears down on the machine while dumping, should not be permitted. The result either or both of these conditions will be a rough surface.

As the paving proceeds, the grade or thickness control devices must be adjusted to give the spread as required by the plans. As continuity of operations is essential to secure a good pavement surface, the speed of the paver should be regulated to avoid stopping and starting.

By observing the surface texture behind the machine, and checking the surface with a straightedge, a malfunction in the paver or segregation of mixture may be detected. The inspector should insist on prompt action to locate and correct any trouble that occurs. Some of the most common difficulties encountered are listed below with the possible cause:

- **Wavy Surface (short choppy waves).** Worn or poorly adjusted tracks or drive chains; truck driver setting brakes too tightly; excessive paving machine speed.
- **Wavy Surface (long waves).** Excessive variation in the amount of mix carried in the auger box; rolling too early; roller operating too fast; over controlling the screed.
- **Excessively Open Surface Texture.** Improper adjustment of the tamper bar; improper speed of tamper bar; screed plate rough or galled; excessive machine speed.
- **Varying Surface Texture.** Insufficient mixing; over mixing; overheating of the mixture; dry mixing period too long; segregation of mix in trucks; worn or damaged screed plate.
- **Bleeding Patches on Surface.** Asphalt not uniformly mixed; excessive moisture in mix; excessive prime or tack coat.
- **Irregular Rough Spots in Pavement.** Roller standing on fresh surface; abrupt reversing of roller; trucks backing into machine; poor workmanship on transverse joints.

All pavers are required to be equipped with automatically controlled screeds. Automatic control of transverse slope as well as proper elevation must be maintained to obtain the required surface. When this unit malfunctions, it tends to compound its errors; therefore, the paver must be stopped immediately, the pavement corrected, and the malfunction located and corrected before

preceding with the operations. Essentially, the automatic grade control unit divorces the screed from the upward and downward movement of the floating arms which attach the screed to the machine, and transfers this control to the unit equipped with a sensor element which travels on a rigidly set or traveling guideline.

When the pavement is constructed in more than one course, the longitudinal joint should be offset from each preceding course with the surface course joint being in the center of the pavement. The screed should overlap the previously laid lane from 25 to 50 millimeters to insure that enough material is available to completely fill the joint.

(4) Compaction. The Contractor is required to furnish the rollers and establish the rolling pattern required to arrive at the density necessary to meet the specifications. The compactive effort should be completed at the highest temperature possible within the mix design limits. The relationship between rolling and temperature must be maintained consistently in order to get consistent compaction results. It is recommended that the breakdown rolling be completed at temperatures above 95°C and that pneumatic rollers be included in the compaction process.

(5) Smoothness. Most paving or overlay projects include a profilograph smoothness specification with incentives and disincentives. Refer to the FLH Field Materials Manual for test methods and data compilation guidelines. Generally the Contractor will run the profilograph under the supervision of FLH personnel. The trace or printout will then be turned over to FLH for analysis.

Bumps or rejected areas are required to be corrected before the final profilograph and pay factor are determined, but the method of correction is subject to approval of the Government. Often grinding or grinding with an emulsion flush is not an acceptable correction because the appearance and physical characteristics of the surface are even less desirable than the rough payment.

9.4.10.3 Measurement

Payment is normally made on a metric tonnage basis for all material delivered, incorporated in the work and accepted. The appropriate specification should be reviewed concerning the testing and inspection of the scales. It should be understood that payment is to be made for the weight of the complete mixture with no deductions for any required additives, and the measurements should be made on this basis. See Chapter 8 for details of weight measurement.

Asphalt cement, when paid for separately, may be measured in one of two ways. The preferred method, and used if the project is the sole user of the plant, measurement is made using the suppliers weigh tickets, with any asphalt not utilized (waste or returned) being deducted from the total.

For commercial plants when asphalt used for the project is not isolated from other production, the asphalt usage should be determined by averaging the asphalt content test results.

9.4.10.4 Documentation

The requirements for documentation fall into two categories quality and quantity.

The quality of asphalt cement will be documented using the certificate of compliance that accompanies each shipment and the test results of the samples taken at the hot plant.

The quality of the mix is documented with the gradation and asphalt content test results and the verification or independent assurance tests performed in a separate laboratory. All tests should be noted on control charts or other production records so that when result are available there is a clear visual representation as to when problem occurred and where the material is on the project.

Quantity documentation for asphalt cement consists of the suppliers weigh tickets or quantity computations based on asphalt content tests.

The weigh tickets for the loads of mixture with the signature of both the weigh person and the spread person will serve as documentation of quantities involved in the project. These tickets should show the project number, the item number, the date delivered, and the truck number. A record of the empty truck weights is also necessary. Two weighings per shift of the empty trucks is required - at least one with the fuel tank full or nearly so. An adding machine tape or computer printout, with the item number, date and

project indicated will serve as documentation for each days production. It should also indicate the persons who computed and checked the quantity.

A copy of the QL-Pay printout should be included in the project documents for each estimate and for final payment.

For final payment a copy of the smoothness data summary and computation worksheet is necessary. Paving quantities to which smoothness pay adjustments are made are determined in accordance with the Contract.

When estimates are paid, quantities should not include tonnage for which Contractor test results are delinquent.

9.4.11 Open-graded Asphalt Friction Course

9.4.11.1 Preliminary Review and Approval

See Section 9.4.10.1.

9.4.11.2 Construction Inspection

The guidelines given in Section 9.4.10.2 should be followed in the inspection of the plant and laydown equipment. Because of the characteristics of the mix, some points will merit special emphasis.

Normally the depth of the course will be only slightly thicker than the size of the largest aggregate, so the elimination of all over size aggregate is a must. The nature of the mix makes repair work behind the screed almost impossible, so it is imperative that control of the mixing and laydown operations is such that problems are corrected before the mix reaches the screed.

Necessary consolidation will be normally attained with one pass of a nonvibrating steel roller. Care must be exercised to avoid over rolling of the mix. Traffic, especially hauling units, must be kept off the newly placed mat until it has completely hardened or shoving and/or rutting will occur.

The temperature constraints given in the specifications should be strictly observed. Experience has shown that the quality of the completed mat is directly related to the weather conditions at laydown the warmer the better.

9.4.11.3 Measurement

The same steps outlined in the asphaltic concrete sections are required for this item.

9.4.11.4 Documentation

See 9.4.10.4.

9.4.12 Open-graded Emulsified Asphalt Pavement (OGEAP)

9.4.12.1 Preliminary Review and Approval

A. General

The Project Engineer may obtain from the Federal Lands Division an excellent reference publication entitled, *A Basic Asphalt Emulsion Manual*, coded FHWA-IP-79-1 (Two volumes). Volume 1, entitled *Understanding and Using Emulsions* should be of particular interest to project personnel. Volume 2, *Mix Design Methods* may also be of value.

Many of the practices used for hot asphalt concrete pavement are also applicable to open-graded emulsion cold mixes. Only significant differences will be discussed in this section. The reader should therefore consult Part 9-4.1 in conjunction with this section.

The major difference is that an open-graded emulsion cold mix has few fines and requires no heat for mixing and placing. Mixture handling characteristics of hot mixes are controlled by the temperature of the material. The thickness of the emulsified asphalt coating controls these characteristics in the cold mix. As the emulsion *breaks*, the mixture viscosity increases rapidly, thereby making these mixes less forgiving than hot mixes during construction. They do, however, produce a very flexible pavement when properly placed.

Both aggregate gradation and moisture content can affect the behavior of the emulsion as it is mixed into the aggregate. These will also affect the behavior of the mixed material as it is transported to the grade and placed through the paving machine.

Emulsified asphalt is composed of finely chopped particles of asphalt cement suspended in a solution of water, emulsifying agent, and oil distillate. Emulsified asphalt specifications place a minimum limit on the percent of asphalt cement residue; a minimum and maximum limit on the percent of oil distillate and the penetration of the asphalt cement residue; and a minimum limit on the ductility of the asphalt cement residue. Other values are also specified for particle charge, coating ability and water resistance. All of these characteristics of the emulsified asphalt affect the behavior of the emulsion during the handling, mixing and laydown operations when producing an open-graded emulsified asphalt pavement. The effects of these emulsified asphalt properties are not all the same.

The stability of the emulsified asphalt prior to incorporation into the aggregate will be determined primarily by the type and amount of emulsifying agent. The stability referred to is the ability of the emulsified material to remain an emulsion. In other words, the emulsion's resistance to the coagulation of the asphalt particles to form the residual asphalt cement. This coagulation is generally called "breaking". Primary factors influencing the behavior of the mixed emulsified asphalt and aggregate are:

- The type and amount of emulsifying agent;
- The amount of moisture in the aggregate;
- The gradation of the aggregate and,
- The amount of manipulation the mixture is subjected to between introduction of the emulsion and placement through the paver.

These factors, along with the influence of the other emulsified asphalt properties, will generally be reflected in the performance of the completed pavement.

Controlling the moisture in the aggregates is area of critical concern. Excellent results have been obtained when dryers were used to dry wet aggregates. However, for economic reasons, drying is usually not specified. A uniform, low aggregate moisture content is necessary to use the specified amount of emulsified asphalt in the mix. As in all asphaltic mixes it is important to have a positive interlock between aggregate and asphalt feed systems.

The adherence to aggregate gradation specifications is also extremely important, more so than for standard hot mixed asphaltic concrete. A fractional percent more than the specified amount of minus 75 μm material can greatly increase mixture viscosities in the mixing chamber and/or paver. These increased mixture viscosities are sufficient to cause operational difficulties which result in rough riding pavements. Because its viscosity changes with temperature, it is advisable to maintain uniform

emulsified asphalt temperatures. A 10°C change in emulsified asphalt temperature will produce a noticeable viscosity change. Higher emulsified asphalt viscosities will permit the aggregate to hold more asphalt. The temperature of the aggregate should also be kept uniform and compatible with the asphalt temperature. Changes in either temperature will affect uniformity of the pavement.

B. Source Approval

The requirement for a very clean, surface dry aggregate at the time of mixing with emulsified asphalt should be kept in mind when reviewing Contractor proposed material sources. This requirement should be particularly stressed when writing source approval letters to the Contractor. This is especially so if the proposed source will require special handling to produce aggregates which are both clean and surface dry. Refer to more detailed discussion of source approval elsewhere in this manual.

C. Mix Design

The mix design is a process to determine how much emulsion the proposed aggregate can hold and to determine the compatibility of aggregate and emulsion (electrostatic charge). Visual observations are made on the mixing characteristics in the laboratory. These tests generally are simple processes. There should be no delay in furnishing materials to the FLH laboratory which is doing, or reviewing, the design. Emulsions may react negatively to certain aggregates due to their chemical composition; therefore, the aggregate or the emulsion may need changing. Maximum possible time for adjustments should be provided by early submission of materials for mix design or mix design review.

D. Pre-Operations Conference

The Project Engineer should confer with the Contractor prior to laydown operations. In addition to the usual topics of a prepaving conference, there is need to insure adequate sand or other suitable blotter material is available, as well as proper application equipment. This is necessary both to apply material to the surface of the newly placed mix, as is usually specified; and to quickly cover any problem area to facilitate traffic and/or environmental protection. The potential traffic need would include any roads used to haul from the plant to the project, because leakage from the haul vehicles can be expected to occur.

9.4.12.2 Construction Inspection

A. General

It is desirable to have a materials specialist available from the Division to assist the Project Engineer during the initial paving start-up, through field testing of the design.

The Project Engineer should plan for at least as large an inspection force as for a hot mix operation, and to spend much personal time at inspection. This is due to the sensitivity of the material to minor changes in mix composition and in changes in the weather. It also relates to the extreme difficulty that might occur as a result of such sensitivity.

B. Plant Operations

The comparatively simple plant usually used for OGEAP is one of its strong points. The inspector needs to be concerned mainly with feed operations to the pugmill. These include the usual concerns for any uncontrolled mixing of separate piles of aggregate through stockpile overlap or misfeeding of separate cold feed bins. Aggregate moisture content also needs to be watched closely. Small changes in aggregate gradation or moisture content can be very critical with these mixes. For example, when working from a stockpile having wet and dry areas, a careless loader operator can vary the moisture content of the aggregate entering the pugmill. The non-uniform moisture content will vary the asphalt content of the mix because it is controlled by the aggregate belt scale feeding the pugmill. An increase in aggregate moisture content over that established during plant calibration will increase the percent of emulsified asphalt to the aggregate. The more free moisture, the less emulsion the mix will hold. Too much water on the aggregate will therefore mean excessive dripping from the trucks and less asphalt for binder in the mix.

If the loader operator were to load aggregate with too many fines, a different problem might result. With finer aggregate in the mix, the emulsion might break too early. If it breaks in the pugmill, the Contractor might be delayed while cleaning up the mess. If it breaks in the paver or prior to raking, some very rough pavement might be laid because of the severe handling problems.

The point of introduction of emulsion into the pugmill is important. This is one adjustment to be considered when the emulsion is breaking either too early or too late, or if the aggregates are not being properly coated.

C. Roadway Operations

Vertical joints at connections to existing pavement must be square cut since the comparatively coarse aggregate will not accommodate "feathering". It is, however, sometimes possible to make special mixes using 9.5 mm or 6.3 mm minus dense graded aggregates for preleveling or for making approaches where feathering is necessary. These mixes will probably require a different type emulsion than that used for the mainline paving. Otherwise, these preleveling and feathering operations might best be done with a dense graded hot mix if it is available. In either case, a contract modification should be considered unless this was covered in the specifications.

Ideally, the OGEAP should begin to change from a brownish color to black, within about 30 meters of the paver. This color change signals the emulsion breaking. That is, the separation of the asphalt and the water. If this is not occurring in that distance, there are several adjustments which can be made. Probably the most important consideration is whether or not the emulsion will have broken sufficiently to withstand rainfall within four hours after placement. A check for this condition is pouring water from a gallon jug onto the completed pavement. One should look for the water to flow out from the pavement edge where it contacts the lower non-porous layer. When the water runs out, a paper towel is placed in it to determine if asphalt is being carried out of the pavement with the water. It is difficult to tell if the water contains asphalt because it may be discolored by the emulsifiers. After the paper towel has dried, it is possible to see any asphalt. It is not uncommon for some emulsion and/or emulsifier to discolor water for several days after laydown. Actions must then be taken to prevent damage to the environment, especially waterways.

If it is determined from the above test that the break is too slow, the mixing time should be increased slightly. The additional shearing action on the emulsified asphalt in the mix, as it is mixed more, will accelerate the break. This can be accomplished by:

- Introducing the emulsion into the pugmill nearer to the aggregate entrance, and/or
- Placing a dam at the output of the pugmill.

If the break is still too slow in occurring, the next step would normally be to change the emulsion formula slightly. The Project Engineer cannot make this change nor can the Contractor. For this reason it is advisable for the Contractor to have a representative from the emulsion supplier on the project until the operation is running smoothly. A final last resort adjustment is to add portland cement to the aggregate prior to the introduction of the emulsified asphalt. A very small amount, usually not more than 0.3 percent by weight of the dry aggregate, is normally sufficient to dehydrate the aggregate enough to permit continued operation. The portland cement is usually added to the aggregate feed belt by a screw auger feeding from a small hopper. The screw auger should be interlocked with the aggregate feed belt in the same manner as the asphalt supply pump.

It is okay if the emulsion turns black during the transport or laydown operation, provided it passes through the paver and can be laid without causing irregularities in the pavement surface. These irregularities usually will take the form of the mat tearing under or behind the paver screed. Occasionally, it may be difficult to maintain proper lift thickness because of the harshness of the mix. When these conditions occur, the emulsion is breaking too soon and mixing time should be reduced. This can also be done by introducing the emulsion more toward the output end of the pugmill. If the pugmill has a dam installed in the output, it should be removed. If these adjustments do not provide the necessary increase in break time, other places in the process should be considered where a reduction can be made in the physical manipulation of the mix prior to its passing under the paver screed. When all of these measures have been implemented and the emulsion is still breaking too early, a change in the emulsion formula will usually be required to correct the condition. Again, this change will require the assistance of the emulsion supplier's representative and will result in a loss of time.

Traffic can usually be accommodated immediately after the addition of the blotter or choker aggregates following the initial rolling. The pavement should soon develop enough stability to support even heavily laden logging trucks, provided the aggregate particles have the specified fracture percent. The load carrying capability of the pavement is determined by the interlock of aggregate particles, not by the type

and/or amount of asphaltic binder. The asphaltic binder serves only to keep the aggregate particles in place in the pavement. The type and amount of asphaltic binder determines how well and how long these particles will remain in place. The stability of the placed and compacted mix should continue to increase with time as the asphaltic binder stiffens with age.

The pavement can be expected to remain much more flexible than a hot mix for a comparatively long time. Problems may occur with turning, stopping, and any other traffic pattern exerting extreme stress on the mat. For example, a truck with a locking brake might gouge the pavement seriously, several hours after placement. For this reason, traffic control should be established which will minimize the occurrence of these stresses. Reshaping and compaction is sometimes possible while the mix is in this state. However, the results are never as good as prevention would have been. If cement has been added, the set will be quicker and harder and it will be more difficult to correct rough areas.

9.4.12.3 Measurement

This item will be measured by the metric ton of total mix, with the emulsion and mineral filler [portland cement] also paid separately by the ton. If emulsion is invoiced or metered by the liter it is converted to metric tons at the rate of 1000 liters per metric ton.

9.4.12.4 Documentation

See 9.4.10.4.

9.4.13 Dense-graded Emulsified Asphalt Pavement

9.4.13.1 Preliminary Review and Approval

Dense-graded emulsified asphalt concrete is a mixture similar to hot asphalt concrete except that the bituminous material and additives, when required, are of such a nature that the mixture may be transported, stockpiled, and placed cold. The contract specifications designate the types of materials to be used in the mix. The special contract requirements will provide the combinations of materials, based on local conditions. There are some special kinds of dense-graded emulsified asphalt concrete which are patented and hence their use is subject to approval of the patent owner and to the payment of a royalty.

The controls expressed in Section 9.4.10.1 also apply to this section with the following additions and/or exceptions:

Mixing Temperature. Control of the temperature will be in accordance with the contract requirements.

9.4.13.2 Construction Inspection

See Section 9.4.10.2.

9.4.13.2 Measurement

See Section 9.4.10.3.

9.4.13.4 Documentation

See Section 9.4.10.4.

9.4.14 Asphalt Treatments

Asphalt treatments include the use of asphalts as a prime coat, a tack coat, a single course surface treatment [chip seal] or a multi-course surface treatment. Because the methods used are the same for all treatments, when the application of asphalt is discussed, the information is valid for all usages.

9.4.14.1 Preliminary Review and Approval

For a chip seal or multi-layered treatment, if required by the Contract involved, a representative sample of this aggregate and asphalt should be sent to the Division laboratory for a mix design, i.e. application rate of asphalt and aggregate. This design should be reviewed to insure that the application rates are sufficient to produce enough residual asphalt to provide proper imbedding of the aggregate.

A good rule of thumb is that 40 percent of the most prevalent size aggregate will be embedded in the residual asphalt. It is important to remember when using emulsified asphalt, that it is normally shipped at a 70/30 ratio of asphalt to water, with the water being only a carrier and has no effect on the holding of the aggregate. A chip seal with insufficient asphalt applied has little or no chance of success.

The traffic control plan should be discussed thoroughly prior to the start of the work, since keeping the traffic off the newly worked area is important to both the success of the treatment and to public relations. An asphalt splattered car or a broken windshield is no laughing matter.

9.4.14.2 Construction Inspection

Prior to commencing operations, it is imperative that the distributor and aggregate spreader, are inspected, so that the material can be uniformly applied throughout the project. Areas of particular interest include the following:

A. Asphalt Distributor

(1) Spray Bar

All nozzles same size

All nozzles at same angle - (15° to 30° - as recommended by manufacturer)

Bar height constant regardless of load Proper height for coverage required double or triple coverage

(2) Bitumeter

No build up on wheel

Dial easily readable

(3) Pumps and Circulation System

Instantaneous shut off

Pressure variations with relative ease

B. Aggregate Spreader

(1) Storage Bin

Truck hook functioning properly

Feeder belts operating

(2) Spreader Box

Gates spreadable

Spreader wheel operable

Speedometer or tachometer functioning

Oversize or scalping screens in place

C. Application Rates

When the Inspector/Project Engineer is satisfied that the equipment is functional, the calculations necessary to obtain the desired rate of application can be made. The variables in the application rates of asphalts from a distributor are: vehicle speed, spray bar width, and the pump discharge rate. Normally the spray bar width is held constant throughout the passes. Often the alignment and grade of the roadway will limit the speed of the vehicle. For a typical prime coat application, the sequence could be as shown below.

- (1) Establish bar width: 10.5 meter roadway plus widening--use three passes at 3.5 meters each.
- (2) Establish practical vehicle speed: For this example, use 8 kph. $8 \text{ kph}/60 \text{ min per hour} = 133 \text{ m/min}$.
- (3) Asphalt characteristics: Desired application 1.6 L/m^2 of CRS-2 at 15°C . Asphalt as delivered = CRS-2 with specific gravity of 0.966 at a temperature of 80°C .
- (4) Correct asphalt for temperature: $1.6 \div 0.971$ (factor from Asphalt Institute Pocketbook) = 1.65 liters at 80°C .
- (5) Calculate pump discharge rate required: $(1.65 \text{ L/m}^2) \times (133 \text{ m/min}) \times (3.5 \text{ m}^2/\text{m}) = 768 \text{ L/min}$
- (6) Shoot test section: ~30 m. Observe coverage and penetration, adjust rate if needed, note liters used and distance covered. Complete distributor load.
- (7) Check applied rate: $(\text{___ L}) \div (\text{m} \times 3.5 \text{ m}) = \text{___ L/m}^2$

If the existing roadway is paved, brooming will be required prior to the application of a tack or seal coat. The broom should be checked for uneven wear, and observed during operation to insure that no ridges of dirt are left on the roadway. The brooming should start at centerline and proceed toward the shoulder.

When the construction requires the spreading of aggregates over the freshly sprayed asphalt, the specifications will usually require a self-propelled, two-axle, pneumatic-tired spreader. The application rate is controlled by the speed of the spreader. Trial and error is the only available method of establishing the desired rate. Placing a container of known area (e.g. 1 m^2), and weighing the stone deposited will give the Project Engineer a starting place. Adjust the speed until desired rate is attained. When placing aggregates on the freshly applied asphalt, it is imperative that the spreader be as close to the asphalt distributor as possible. At no time should more than 1 minute elapse between the asphalt spray and the chip spread. The rolling should take place using rubber-tired rollers, treadless tires only, as close to the spreader as possible. All rolling must be completed before the asphalt has set. Over rolling or late rolling can break the bond between the stones and asphalt. If the application rate of asphalt and aggregate is rapid, more than one roller will be required.

The application of chips should be a single layer of stones, with small separation between stones. Avoid over-application of aggregate; this will result in none of the stones being correctly embedded. After the chips have been applied, brooming with light, even pressure may be required to remove the excess aggregate.

Application of a chip seal should never be attempted under adverse weather conditions. The stones should be as free of dust as possible and dry or only slightly damp. There are many factors that will effect the success or failure of a chip seal. Any combination of them can cause a less than satisfactory result. Things to look out for are:

- Cool weather. Slow setting or "break" of the asphalt bonding action interrupted by cold nights are a particular hazard.
- Dirty aggregate. Fine particles soaking up too much asphalt with remainder insufficient for proper embedding.
- Insufficient asphalt.
- Excessive asphalt. Bleeding, slick areas, loss of friction.

- Excessive aggregate. Too much competition for asphalt.
- Over-diluted emulsion. Same as insufficient asphalt.
- Dust, dirt, moisture on roadway. Bond between roadway and chips prevented.

9.4.14.3 Measurement

If payment for asphalt is by the metric ton, measurement can be made by weighing or by using weights from the suppliers weigh tickets. If payment is by the liter, measurement can be made either by converting the weight to liters at 15°C or by measuring the liquid in the tanks or hauling units and converting to liters at 15°C. For emulsions no correction for temperature is required. The factor of 1000 liters per metric ton is always used. In any event, there must be a deduction for unused or wasted material.

Aggregates, if paid for by the cubic meter, are to be measured in the hauling units or by converting weights to cubic meters. If payment is by the metric ton, material must be weighed in accordance with the procedures in Chapter 8.

9.4.14.4 Documentation

Documentation requirements are similar to those in Section 9.4.10.1. In addition, if aggregates are measured in hauling units, a system for documenting measurement and delivery must be devised to fit the circumstances involved.

During the course of the work there should be periodic comparisons of the materials spread on the road vs. those invoiced for payment. If, due to the difficulty in controlling storage tank quantities, wasted materials and those not used, the Project Engineer decides the weight based invoices are unreliable, the use of daily spread computations/tabulations may be directed to be used for payment instead.

9.4.15 Minor Asphalt Concrete

This material is typically obtained from local or commercial sources where the use or quantity involved does not justify the use of more comprehensive FLH materials specified in Subsection 9.4.10.

9.4.15.1 Preliminary Review and Approval

The contract requirements define the required certifications and documentation to be submitted by the Contractor prior to the supplying of the mixture. These should be reviewed and approved if the proposed mix meets contract requirements. If the mixture is designed to meet a local agency specifications, contact should be made with the agency and the adequacy of the mix for the purposes intended verified. If serious doubts as to the quality of the product arise, an alternate submittal should be requested, or mix design and quality tests should be taken per Section 9.4.10.1.

9.4.15.2 Construction Inspection

See Section 9.4.10.1.

9.4.15.3 Measurement

Weigh tickets from the material producer can be used as measurement of the amount delivered.

9.4.15.4 Documentation

Copies of the producer's certifications for the asphalt and the mixture will serve to document the quality of the product. Signed weight tickets will document the quantity delivered.

9.4.16 Portland Cement Concrete

9.4.16.1 Preliminary Review and Approval

A. Mix Design

Responsibility for concrete mix design is normally assigned to the Contractor. Documentation is submitted by the Contractor to FLH. The mix design data is approved, rejected or conditionally approved by Project Engineer (if so delegated) or the COE, after concurrence of materials specialists. Normally, FLH will not do verification testing of the mix. However, if the FLH elects to do verification testing, the Contractor should be so advised and samples requested as early as possible. The procedure may be appropriate when the following occurs:

- The specified concrete is required to have unusually high strength or other characteristics for which the producer has no historic records or data.
- The concrete is composed of components from sources not previously used for structural concrete by FLH or another organization.
- The concrete contains an admixture or additive; e.g. super water reducer or fly ash for which the producer has no experience or production data.

In any case, it is the FLH's prerogative whether or not to do mix design testing.

Approval is based on the quality and other specification requirements of the component materials; and whether the mix will comply with the strength, air and water/cement ratio requirements during production. As a minimum the proposed mix design should include cylinder strengths at least from 7-day cylinders which indicate that the 28-day strength will not be a problem. If strengths are marginal, and especially if air and water are on the low side of the specifications, the Contractor should be advised of the potential risks of nonspecification concrete. Regardless of air, water and strength indicators under laboratory conditions, the Contractor remains obligated to comply with these specifications during production.

B. Batching Procedures

The Contractor is generally assigned responsibility for batch plant procedures. The Project Engineer may elect to perform occasional batch plant inspections prior to the start of production or at other times during production. The FLH will not normally perform full time plant inspection during every batching operation. The Contractor's/supplier's QC plan should address batch plant quality control.

Batch Plant Inspection Checklist:

- Storage, uniformity and identification of aggregates, cement and admixtures.
- Quality Control tests and their documentation.
- Facilities to weigh or otherwise measure components.
- Batch ticket documentation procedures.
- Facilities to measure, control and adjust for aggregate moisture.
- Facilities to heat or cool concrete during adverse weather operations.
- Facilities to mix and deliver concrete.
- Truck cleanout facilities and procedures.

C. Volumetric Batching

Volumetric batching, where aggregates, cement, water and admixtures are metered and mixed continuously is permitted by the specifications. Since volumetric batching eliminate most variability in batching and mixing time it can result in more consistent mixes, especially when high range water reducers are used. Detailed requirements for volumetric batching are contained in AASHTO M 241. Some of the pertinent sections of AASHTO M 241 are reproduced here for information:

- Control Devices. If volume proportioning is employed, devices such as counters, calibrated gate openings, or flowmeters must be available for controlling and determining

the quantities of the ingredients discharged. In operation, the entire measuring and dispensing mechanism must produce the specified proportions of each ingredient.

- **Manufacturer's Recommendations.** The recommendations of the equipment manufacturer in the operation of the equipment and in calibrating and using the various gauges, revolution counters, speed indicators, or other control devices should be followed.
- **Visibility and Access.** All indicating devices that bear on the accuracy of proportioning and mixing of concrete shall be in full view and near enough to be read by the operator while concrete is being produced. The operator shall have convenient access to all controls.
- **Checking.** The proportioning and indicating devices shall be individually checked by following the equipment manufacturer's recommendations as related to each individual concrete batching and mixing unit.
- **Accuracy.** Adequate standard volume measures, scales, and weights shall be made available for checking the accuracy of the proportioning mechanism. The device for the measurement of the added water shall be capable of delivering to the batch the required quantity within the accuracy of +1 percent; the device shall be so arranged that the measurements will not be affected by variable pressures in the water supply line.
- **Yield Check.** Essentially, the volume of concrete discharged from the mixer is checked by first weighing the amount of concrete discharged during some number of revolutions, or as determined by some other output indicator. This is followed immediately by a determination of the mass of concrete per cubic meter. The mass of concrete discharged divided by the mass per cubic meter is equal to the number of cubic meters mixed and discharged during the chosen interval. The accuracy of the output indicator is thus checked by this expedient.
- **Yield Sample.** It is recommended that about 0.07 to 0.09 cubic meters be discharged for this purpose. This amount of concrete will weigh from 170 to 220 kilograms and can be discharged into, and contained in a small steel drum or other suitable container which in turn can be placed on a scale of adequate capacity. The output of a batcher-mixer unit may be indicated by the number of revolutions, travel of a belt, or changes in gauge readings; if so, these figures should be used as a measure of output.
- **Proportioning Check.** Whenever the sources or characteristics of the ingredients are changed, or the characteristics of the mixture are noted to have changed, the Engineer may require a check of the fine aggregate content and the coarse aggregate content by use of the washout test. Essentially, in the washout test, 0.025 cubic meter of concrete is washed through a 4.75 mm sieve and 150 μ m sieve; that retained on the 4.75 mm sieve is normally considered coarse aggregate, and that passing the 4.75 mm and retained on the 150 μ m sieve is considered fine aggregate. The mass of the retained aggregates should then be compared to theoretical masses computed from the mix design data. Significant differences suggest that the design mix is no longer being produced.
- **Water.** The rate of water supplied the continuous mixer shall be measured by a calibrated flowmeter coordinated with the cement and aggregate feeding mechanism, and with the mixer. The rate shall be capable of being adjusted in order to control slump at the desired levels and to determine that the maximum water/cement ratio is being met.
- **Admixtures.** Liquid admixtures shall be dispensed through a controlled flowmeter.

9.4.16.2 Construction Inspection

See Sections 9.4.17, 9.4.18 and 9.4.19 for procedures relative to falsework, forms, reinforcing steel and other incidentals.

During concrete placement inspection operations, the Project Engineer or Inspector is normally concentrating on the placement at the structure while the Contractor's QC personnel should assume

responsibility for completion of the batch ticket, quality control of discharge operations and all required tests. During the first one or two placement operations, extra attention by the Project Engineer may be needed to assure that the Contractor properly assumes this responsibility. The Contractor, however, should not be permitted to rely indefinitely on FLH for quality control. After the first few placement operations, intermittent monitoring of concrete inspection should be sufficient.

Concrete Discharge Inspection Checklist:

- Completion and receipt of batch ticket.
- Control of additional water or admixtures.
- Control of time of mixing and discharge.
- Temperature and slump of mix.
- Control of air content.
- Quality assurance tests to document acceptance.

9.4.16.3 Measurement

Concrete is normally included in the contract item in which it is incorporated. When concrete is paid as structural concrete, it is complete and in place in the structure. Quantities are usually determined by the theoretical dimensions of the structure and paid as a contract quantity or lump sum. The Project Engineer should have access to design computations, and should not have to recompute concrete quantities in the absence of evidence that they are in error.

9.4.16.4 Documentation

See FLH Field Materials Manual for guidelines for materials related documentation.

9.4.17 Concrete Structures

9.4.17.1 Preliminary Review and Approval

The following items normally require attention before concrete placement.

A. Contract Requirements

The Project Engineer and inspectors should have reviewed in detail all requirements of the contract. Any questions should be resolved with the Construction Operations Engineer, in consultation with Bridge Engineer as may be necessary.

B. Submittals

The Contract will normally require a number of submittals for approval prior to certain work commencing. It is important that the Contractor and the Project Engineer communicate as to the schedule for these submittals, the estimated time it will take to review and approve them, and what the criteria for approval will be. Sometimes these approvals go beyond the stated requirements in the Contract, and are required to be based on industry standards or even regulatory requirements.

See Section 5.7.1 for submittal review and approval responsibilities.

C. Falsework and Forms.

(1) Falsework Design. The contractor's submittal should include:

- All loads (such as finishing machine), location of loads, and loadings assumption, e.g. associated with rate of concrete placement for vertical members.
- Species and grade of lumber, all dimensions (span, width, thickness) of members and forms, allowable stresses used, calculated deflections, type and size of bracing.

- Type, size and capacity of connections (bolts, hangers, spikes, nails etc.).
- Manufacturer's recommendation or tests for manufactured assemblies.
- Bearing value of supporting materials, wind and other external load assumptions.

If the drawings are not complete, they should be returned to the Contractor to be completed before forwarding to the Bridge Engineer. Unless the special contract requirements waive the standard requirement, the drawings must be prepared and sealed by a licensed registered professional Engineer.

(2) Contractor's Schedule and Equipment. The Contractor's intentions for scheduling, rate of placement, equipment to be used, curing material, etc., should be discussed in order to adequately plan inspection and testing and to be sure the Contractor has adequately planned the placement operation.

(3) Foundation Bearing Capacity. The bearing capacity of foundation material is required to be determined by the Contractor and reflected in the design assumptions of the falsework. The determinations may be based on standard tables, or in cases of marginal material or disputed assumptions, the Engineer may insist on actual tests. Exhibit 9.4A, Allowable Bearing on Sandy Soils; and Exhibit 9.4B, Allowable Bearing on Clayey Soils, may be used by the Engineer to confirm Contractor assumptions.

Tests and assumptions must be based on a worst case condition. I.e. if the foundation may become saturated during construction, the design must be based on that condition. Alternatively the Contractor should include a drainage plan in the falsework drawings submitted for approval. The plan must provide an effective means of draining the area around the falsework for the duration of its use.

When tests are required, they may be simple static load vs. settlement tests, or more in-depth tests as may be suggested by the Contractor, and concurred in by the Engineer. The Engineer should be confident that the test reflects the capacity of the foundation, and not just a layer of good material overlaying poorer material. Steel scaffolding type falsework is particularly vulnerable to foundation problems because of its sensitivity to differential settlement/loading.

(4) Used Materials. When used materials are anticipated for the falsework design, it is the Contractor's responsibility to identify and reflect appropriate reductions in sections or maximum working loads. The documentation should be a part of the falsework submittal. When the materials are finally incorporated into the falsework structure, it must be verified that the assumptions on which the design was based, are consistent with the apparent condition of those materials. If the Engineer has a basis to question any of these materials, they should be rejected unless the Contractor conducts tests or otherwise clearly demonstrates their validity.

D. Stakeout

The Government should furnish the Contractor data on the permanent or semipermanent control points by which the structure is to be staked and constructed. If the initial control points will not be usable for checking during construction, then the Project Engineer should set and check additional control points or reference lines for checking. The Contractor should be held responsible for all control points, reference lines and other surveying for the proper layout of the structure.

E. Quality Control Plan

See Section 9.4.16 for concrete requirements. The Quality Control Plan should have been submitted and approved prior to concrete placement. The QC plan should address the duties, responsibilities and authority of all management and QC personnel. The plan should adequately address the responsibility of supplier QC personnel.

9.4.17.2 Construction Inspection

A. Excavation

The excavation and foundation for both the structure and the falsework must conform to the contract requirements or design assumptions and must be excavated to the required elevation. The excavation for footings must be dewatered prior to concrete placement unless underwater placement is approved.

B. Falsework

(1) Consistency with Approved Design. The Contractor is required to arrange for inspection of the falsework prior to concrete placement by a licensed professional engineer; and to certify in writing that the installation conforms to the approved design, contract requirements and acceptable engineering practice. The Engineer should coordinate with the Contractor to participate in this inspection. Exhibit 9.4D, Checklist For Falsework Inspection, is a good outline for the inspection of falsework prior to concrete placement. Deviations from the approved drawings must be approved and concisely documented in the files with a copy to the Bridge Engineer, through the COE. Any changes to the materials, type of manufactured assembly, connections, footings or dimensional configurations of the various components of the falsework must also be approved and documented.

(2) Changes. Requests for approval of all changes will normally be through the COE to the Bridge Engineer. When the Project Engineer has substantial experience and structural knowledge, the COE may delegate the authority to approve minor deviations to suit field conditions or the availability of materials, if it is evident by inspection that the deviation neither increases the stress in, nor the deflection of any falsework member beyond the maximum value allowed by the specifications; and does not reduce the load-resisting ability of the falsework system as a whole. Substantial (other than minor) changes may not be informally field approved. The following are examples of substantial changes which would entail a formal request and submittal from the Contractor with all supporting calculations and literature:

- A change in the size, spacing or placement of any primary load carrying member.
- A change in the method of providing lateral or longitudinal stability.
- Any change, however minor, which affects the falsework to be constructed over or adjacent to traffic opening.
- A revised concrete placing sequence, if it materially affects the stresses in load-carrying members.

All changes must be formally documented. The internal form, Report of Field Changes to Falsework/Formwork, (Exhibit 9.4C), is provided as the mechanism to accomplish this documentation or initiate approval.

(3) Piling. Piles driven for falsework should be inspected for bearing capacity and alignment. The procedures in Section 551 of the Standard Specifications should be used to estimate bearing capacity.

(4) Timber Members. Timber members should be checked to verify that they are the proper grade (if a grade is required or assumed) and dimension, and are not damaged or defective. The dimensions in question should be actual dimensions, not the nominal dimensions, unless the design is based on nominal dimensions. Required blocking should be included in the design submittal. Additional blocking, shimming and wedging should be kept to a minimum; and should be used primarily to assure full bearing and to make fine adjustments in elevation.

(5) Steel Members. Steel members must be inspected carefully for loss of section due to welding, holes or web openings. Welded splices, should be inspected visually for obvious defects: however, radiographic inspection or other methods of nondestructive testing are not required unless the Engineer's visual inspection suggests the welds are defective. If the falsework design is based on steel other than AASHTO M 183M [A36M] grade, the Contractor must produce a certification or other evidence that actual steel furnished is the required grade.

Field welds designed up to 150 Newtons per millimeter of 3 millimeter fillet weld may be accepted based on visual inspection. If higher values are required, welding and inspection must be in accordance with AWS D1.1.

(6) **Manufactured Assemblies.** Steel shoring components should be inspected before assembly to verify that all components are a part of the approved system. Components should also be inspected for dents, bent members, cracked welds, rewelding and corrosion. Such members must be rejected. After erection, the systems must be plumb, jacks installed at the top and bottom and in firm contact, all connections fitted together evenly, and locking devices in good working order. Screw jacks must not be extended beyond the manufacturer's recommendations, and must be fitted with the proper hardware to be compatible with the frame legs and held firmly in line with the axis of the leg. Other manufactured assemblies should similarly be inspected and verified as being used consistently with the approved drawings and the manufacturer's recommendations.

(7) **Exterior Bracing.** Exterior bracing must be included in the falsework design when multi-tiered structures, wind loading or other factors cause concern with respect to lateral loads and stability. Exterior bracing should be checked for adequate sizes and for adequacy of connections. Cable connections must be tight and secure.

(8) **Traffic Openings.** Openings through falsework for public traffic requires enhanced design standards in the vicinity of the opening to minimize the risk of damage due to errant vehicles. Falsework members installed adjacent to, or over traffic openings must be immediately temporarily braced until the entire system is in place and permanent restraints in place. Minimum vertical and horizontal clearance should be provided at all times and verified immediately upon erection.

(9) **During Concrete Placement.**

(a) **Tell Tales.** Prior to concrete placement, the Contractor should install tell-tales under the structure. A tell-tale is a rigid strip of vertical wood, metal or fiberglass (25 mm by 50 mm lumber is common) reaching from the underside of the formwork to a pin or stake driven firmly into the ground. The end of the pin is free, and is marked before concrete placement so that during placement settlement can be monitored. Tell-tales should be installed near the vertical supports for the falsework, but sufficiently away from falsework foundations which may settle.

(b) **Incipient Failure.** As concrete is being placed, the falsework and tell-tales should be inspected at frequent intervals. The following items, in particular, are indications of incipient failure, where immediate response is required.

- Excessive compression at the tops and bottoms of posts and under the ends of stringers.
- Pulling of nails in lateral bracing; movement or deflection of braces.
- Excessive deflections of stringers; tilting or rotation of joists or stringers.
- Excessive settlement of tell-tales (10 mm more than the anticipated settlement).
- Posts or towers that are moving out of plumb.
- The sound of falling concrete, cracking timbers or popping welds.

Any response to these problems should address safety issues first, including the possible evacuation of the site.. The safety of workers and the public is more important than technical issues.

C. Form Layout

Contractor's surveyors should have checked all forms as to exact location and elevation. The Project Engineer or Inspector may review this process or make spot checks. After initial process check type reviews, comprehensive checking by FLH should not be necessary,

D. Reinforcing Steel

See Section 9.4.19.

E. Deck Forms

The Contractor is responsible for setting deck forms and reinforcing steel and screed rails to grade. If all of these items are not set properly, they will not relate properly and the deck will be too thick, too thin, or the steel will not have sufficient cover.

After the screed rails are set, the entire deck placement plan should be checked in the presence of the Project Engineer or Inspector. Note that when the screed is supported by the deck overhang rather than by girders, these supports must be firm enough so there is no significant variability or *bounce* in the screed elevation. The deck should be checked on a 3 to 5 meter grid over the entire deck surface. The Contractor should check the thickness of the deck (from the screed to the deck form) at each grid point as well as the reinforcing steel cover. Minor adjustments should be made by raising or lowering the deck forms (assuming the screed rails and settings have previously been verified as good).

If the adjustments are of such number and magnitude as to indicate the deck is not ready to be checked, the Inspector should arrange with the Contractor to come back at a later time or day when the Contractor believes the deck will be ready. It is inappropriate for the Engineer or FLH inspector to be a part of the routine deck grade setting process.

F. Cleanup

All debris, water, ice, etc. should be removed from the forms before concrete placement is authorized.

G. Concrete Placement

The Contractor is responsible for quality control during concrete placement. FHL's role should be one of overview and verification. If the Contractor is not properly assuming the quality control responsibility, the problem should be addressed in specific terms. See the contract clauses relative to inspection of construction and material and workmanship.

Normally, small and medium sized placement operations should require only one FLH Inspector once initial starting problems are worked out. The inspector should not be reluctant to request Contractor assistance whenever necessary.

The following items require attention during concrete placement.

- (1) Concrete Discharge. See Section 9.4.16.
- (2) Placement and Vibration.
Concrete should be placed near its final location by pump, bucket, buggy or chute. Vibration is essential to avoid air pockets under re-steel and in corners.
- (3) Form Alignment.
Tall or slender forms such as those for columns should be monitored for alignment as the placement progresses.
- (4) Deck Surfaces.
The Contractor should be making spot checks with a 3 meter straight edge to assure proper surface tolerances. Particular attention must be paid to surfaces beyond the limits of the finishing machine.
- (5) Scheduling of Concrete Delivery. Occasionally, due to poor scheduling of trucks or equipment breakdowns, the delivery of concrete may not be continuous as is required by the specifications. If this happens, it is important that the Contractor take all appropriate action to minimize damage due to *cold joints*. Such action may consist of the following:
 - Shading and/or fogging exposed concrete faces to prevent drying.
 - Using a vibrator to keep the exposed concrete face plastic. This can be done for 2 hours or more if the concrete is cool (less than 20 °C).

It is emphasized that these are emergency actions of limited useful duration. More drastic action, such as constructing an emergency construction joint or a total washout of a partial concrete placement operation, should be required whenever the structure may have been weakened.

When the Contractor's scheduling problems are chronic and avoidable, the Project Engineer should communicate the deficiencies in writing and direct the Contractor to take corrective action such as furnishing standby equipment.

H. Curing and Protection

Curing materials and water must be available to begin curing as soon as initial set has taken place and the water sheen has disappeared.

In cold weather, the equipment required by the Contractor's approved cold weather concreting plan must be available and ready to install.

Curing compound, mats, water, etc. must be applied as soon as possible. The Contractor should not wait until a large deck pour is completely finished before starting to apply these materials.

When forms are stripped before the curing period is over, curing materials must be applied immediately.

When a curing compound is used there should be periodic verification that it is being applied full strength at the required rate.

Particular attention must be given to sidewalk and curb construction joints that are obstructed by steel during the deck placement. A curing compound is normally not usable in these areas. Wet burlap or other acceptable procedures must be used to ensure that these areas are kept moist during placement and continuously during the curing period.

I. Hot Weather Concreting

Before concreting in hot weather, the Contractor should be required to compare the proposed procedures with the requirements of the Contract to determine if procedures are adequate. The following factors affect the evaporation rate of surface moisture from concrete:

- Air Temperature - If anticipated daytime air temperature is too high, night time (lighted) operations may be the only alternative.
- Wind Speed - Wind screens may be necessary to insure relatively calm conditions and reduce evaporation.
- Humidity - In dry areas, fogging equipment may be used up wind from the placement operations to raise the humidity.
- Concrete Temperature - Through the use of ice as part of the mixing water, or other means, the concrete temperature should be held low enough to conform to anticipated conditions.

Exhibit 9.4E, Evaporation Rates in Hot Weather, shows the relationship among these factors.

J. Cold Weather Concreting.

Before concrete placement, when air temperatures might be less than 2°C during the curing period, the Contractor must have an approved plan for maintaining the minimum temperature. This plan should address the following:

- Concrete Temperature - Provisions may be required at the plant to heat mixing water or aggregates in order to achieve minimum temperature.
- Forms and Insulation - Depending on circumstances, forms may have to be designed with insulation, or similar precautions such as flooding of footings or layers of straw may be used to avoid freezing.
- Heat - If artificial heat is required, the Contractor should have a comprehensive system of monitoring and maintaining. There should also be special precautions to be sure that moisture is maintained for curing during the heating process.

- Thermometer - Depending on contract requirements, either the Contractor or the Government is required to furnish a thermometer to monitor temperature during curing.

K. Removal of Forms and Falsework.

Falsework must not be removed so as to produce excess stresses in the concrete. The contract may require minimum percentages of 28-day strength be reached prior to form removal. It is permissible to use statistically based prediction techniques to determine if the minimum strengths have been achieved.

The specifications may contain specific requirements regarding the removal of falsework, or a removal plan may be required as a part of the falsework submittal. Whether or not an approved removal plan is required, to prevent damage to the completed structure, and to maintain the safety of the public and onsite personnel, the Contractor's removal plan should be discussed with the Engineer ahead of time. This is particularly important with respect to removal operations adjacent to, or over traffic openings. If temporary bracing was required during installation, then it is also required during removal unless another method of maintaining stability is provided.

Waterproof (metal, sealed etc.) forms which are part of the curing process may not be removed during the curing period unless provisions are made for continuing that process during stripping and finishing. These provisions may include curing compound, water spray, and wet burlap, or combinations thereof.

9.4.17.3 Measurement

A. Contract Quantities.

Structural concrete is normally paid as a part of a lump sum item or on the basis of quantities computed by the designer and specified in the plans. It should not be necessary to recompute or verify these quantities unless discrepancies are brought to the attention of the Project Engineer. If discrepancies are alleged, the Project Engineer may elect to check only the parts of the structure in question, or all concrete may be recomputed. The designer may be asked for assistance if checking becomes necessary.

B. Staked or Ordered Quantities.

When final quantities are not specified in the plans, or when these quantities are adjusted or corrected, payment is normally on a staked or ordered quantity basis. The Engineer should determine in the field the required minimum dimensions of the structural element involved (e.g., a subfooting), and provide the Contractor with these authorized dimensions. These dimensions become the basis of the computed quantity. Upon completion, the inspection verifies that the structural element has been constructed within acceptable tolerances, but no detailed remeasurement is required. If the Contractor elects to construct slightly greater dimensions, no additional payment is necessary.

C. Measured Quantities

Occasionally the contract may authorize payment on a measured quantity basis. This method implies a higher level of control during construction, since the Government is going to pay for all concrete placed. This method is usually used when concrete is authorized to fill a void of unknown or odd dimensions. Measurement may be simply based on the quantity of concrete batched and placed if dimensions are inaccessible.

9.4.17.4 Documentation

The following is a list of minimum requirements for documentation of construction of concrete structures:

A. Falsework

All changes to actual falsework as compared to the approved design should be documented on the form, Report of Field Change to Falsework/Formwork (Exhibit 9.4C).

The Checklist for Falsework Installation (Exhibit 9.4D), is an outline of what the Contractor's QC and inspection personnel should be checking to document compliance with FAR Clause 52.246-12, with Section 552 of the Contract, and with OSHA Regulations, Sections 1926.700, 1926.701 and 1926.702. This checklist is provided to assist the inspector in documenting an independent check of the Contractor's procedures and the ultimate conformity of the falsework to the approved drawings. If the Contractor is not competently performing these functions, a Directive ordering corrective action must be issued. At that point, if the Engineer thinks it would be helpful to provide the Contractor with a copy of the checklist for

guidance, that is permissible. However, the Engineer should be wary of moving toward a situation where the Contractor's inspection/quality control responsibilities are usurped by comprehensive FLH inspection procedures.

Prior to the beginning of concrete placement the Contractor is required to provide a certification by a licensed Professional Engineer that the installation has been inspected and conforms to the approved design.

B. Forms and Steel

A notation is appropriate in an IDR, a field book or in placement records that falsework, forms and steel have been checked for compliance with the contract.

C. Quantities

If payment is by contract or plan quantity, that quantity should be referenced in the estimate book. If payment is by ordered (computed) quantity, complete documentation of these computations is required.

If payment is by measured quantities, batched quantity with deduction for estimated non-usage, should be documented. Except if the contract provides that payment be made for all quantities which the Government orders, wastage will not be deducted.

Approximations are adequate for progress payments if plan quantities are used for final payment. Usually approximations are based on an approximate breakdown of the plan quantities. Use of batched quantities for approximation is discouraged since errors may accumulate over several placement operations.

D. Placement Record.

The placement record should detail the structural component placed, conditions, problems, time, etc. This information should be filed with or cross referenced to load tickets and test reports.

E. Curing and Heating.

Diary entries or supplemental records must document inspection during curing/heating periods to verify temperatures and presence of moisture.

9.4.18 Prestressed Concrete

9.4.18.1 Preliminary Review and Approval

A. Shop Drawings

All prestressed components must have shop drawings approved by the Bridge Engineer prior to fabrication.

B. Equipment and Facilities

Equipment and facilities, especially in the case of temporary fabrication sites, must be approved. Facilities for curing require special attention. See below relative to remote sites.

C. Inspection and Testing

For remote fabrication sites inspection and testing may be arranged commercially or through a State highway department. The Materials Engineer will arrange this when requested.

D. Moving, Transporting and Stressing

It will be necessary to have an approved procedure for evaluating concrete strength in preparation for transporting or stressing the elements. A statistically based early strength prediction procedure is acceptable for this purpose.

9.4.18.2 Construction Inspection

Intermittent inspection is required at each stage of the operation. Comprehensive inspection is usually necessary during concrete placement and tensioning of steel.

A. Beds and Forms

Forms should be inspected for dimensions and stability. Anchorage tie downs should be available as required.

B. Reinforcing Steel and Inserts

See Section 9.4.19. Ducts and inserts for voids must be located accurately and tied down to counteract buoyancy.

C. Pretensioning.

Strands must be clean and acceptably free of corrosion immediately prior to concrete placement. Tensioning systems must be supported by approved calculations and verification after tensioning. Thermal effects, slippage and elongation must be considered.

D. Concrete Placement

See Section 9.4.17. High frequency internal and/or external vibrators are often necessary to consolidate low slump concrete in congested forms for prestressed elements. High slump concrete utilizing a high-range water reducer is sometimes appropriate if requested by the fabricator and approved in accordance with the Contract.

E. Post Tensioning

Tensioning should comply with the approved shop drawings. Ten to twenty percent of ultimate load should be applied to take up slack before measurement of elongation. Anchorage and tensioning devices must perform without apparent defects.

F. Grouting

A guide to good practice is that grouting should be performed within 5 days of tensioning unless special anticorrosion precautions are taken. Ducts should be flushed and blown out with compressed air before grouting. Components of the grout shall have been previously approved prior to use. Pumps and gauges must be in proper working order with backups available.

9.4.18.3 Measurement

Prestressed elements are normally paid as a lump sum or plan quantity item. No additional measurement is required. If post tensioning is paid separately, the Contractor may be requested to furnish a breakdown for progress payment purposes. Even if it is not paid separately, the value of the post tensioning should not be paid in progress payments until the work is actually done.

9.4.18.4 Documentation

In addition to normal concrete and reinforcing steel documentation required by Sections 9.4.16.1 and 9.4.19.4, the following items should be addressed:

A. Materials Records and Certifications

Documentation should include prestressing wire and grout components.

B. Tensioning Records

Identification of member and prestressing wire used, jacking equipment, elongation calculations, gauge readings or other verification computations showing assumed slippage, compression, etc.

C. Stress Transfer

Concrete records should indicate that the required concrete strength has been achieved prior to stress transfer.

D. Equipment

Calibration records should be available and checked for all jacking equipment used in the operation.

9.4.19 Reinforcing Steel

9.4.19.1 Preliminary Review and Approval

The Contractor should submit shop drawings or cut sheets for all reinforcing steel prior to fabrication. It is normally not necessary to submit routine cut sheets to the Bridge Designer for approval. They should be fully reviewed and approved or noted differences marked and returned to the Contractor by the Project Engineer.

If the plans include a design reinforcing steel detail, these sheets may be used to compare to and approve the cut sheets. However, the fabricator may make minor changes in bar lengths to account for shortening at bends, etc.

The epoxy coating process should be subject to independent inspection arranged by the Materials Engineer. This inspection may be by FLH specialists, State inspectors or a commercial testing firm.

Upon delivery of the steel, the Project Engineer should be furnished certifications and mill test reports for all reinforcing steel. The documentation must be provided before the steel is paid for. Bars must be identified by markings as to grade, mill, size, and type of steel. Exhibit 9.4 9-5.4(a), Identification Marks - ASTM Standard Bars, may be used to verify that the bars and certification grades indicated are the same.

It is not necessary for the Project Engineer to check dimensions of all steel upon delivery, as it is often difficult until it is placed in the forms. A cursory check should be made to verify the entire shipment has been received as represented by the documentation.

9.4.19.2 Construction Inspection

Except for epoxy coated bars, reinforcing steel requires only intermittent inspection until a portion of a structure is complete and ready for concrete placement. Inspection should then be comprehensive in conjunction with approval to proceed with the placement. Upon delivery, epoxy coated bars should be checked for cracks, pinholes, and coating thickness. Special equipment may be obtained for checking the thickness and completeness of coating.

A. Storage and Handling

Reinforcing steel must be stored where it will be protected from dirt and grease. Minor rust is not normally a problem for non-coated steel, but it should be protected when stored in marine environments where major rust and scaling is likely.

B. Placing and Tying

Bars must be supported and tied so as not to deflect significantly under construction and concrete placement conditions. Refer to CRSI guidelines for specifics. Deck steel should not be used to support buggy ramps or other heavy equipment. CRSI and ACI contain tolerances for minimum cover, vertical and lateral placement, as well as minimum frequency of ties.

Proper placement of deck steel is particularly important. The procedure described in Subsection 9.4.17.2 E should be used to verify proper placement and cover for deck reinforcing steel.

C. Placement of Concrete

Prior to concrete placement, steel must be cleaned of form release agents or any other detrimental substances. In hot weather it may be necessary to shade reinforcing steel and/or spray with fresh water to cool it to less than 32 °C.

After concrete placement, splice bars and other protruding bars must be cleaned of concrete splatter.

9.4.19.3 Measurement

Reinforcing steel is normally paid on a plan quantity basis. No remeasurement or computational checks are necessary. However, if changes are ordered by the Government or significant errors are discovered in the plans, the quantities should be adjusted to provide for these changes or errors. Minor adjustments in bar lengths to conform to fabrication standards are not considered significant.

Exhibit 9.4G, ASTM Standard Reinforcing Bars, may be used to compute quantity changes in reinforcing steel.

9.4.19.4 Documentation

The following are minimum documentation requirements for reinforcing steel.

- Certification and mill test reports must be on file covering all reinforcing steel.
- For epoxy coated reinforcing steel inspection reports covering the coating process, as well as inspection reports on condition after delivery should be on file.
- Prior to each concrete placement, diary entries or a placement report must document that all steel to be incorporated in that placement has been checked as to size, location, cover, etc.
- All changes in contract quantities must be documented by detailed computations.

9.4.20 Piling

9.4.20.1 Preliminary Review and Approval

A. Test Piles

Test piles are several ordinary piles driven in advance of ordering the remainder of the piles, in order to better estimate the order length of the remainder and to minimize cutoffs and splices. Test piles are normally tested only by their driving characteristics. If test piles are required, it must be determined if the test pile lengths are specified or if they must be ordered. If the latter is the case, the Project Engineer should consult with the Construction Operations Engineer to agree on the order lengths.

B. Load Tests

Load tests are when a previously driven pile is tested by loading to its design load, or to failure to determine if driving characteristics give an accurate estimate of actual capacity. Load tests are very expensive and not normally performed in highway structure construction, except for experimental work and under unusual [usually friction pile] situations.

If one or more load tests are required, all equipment as well as the layout of the tests must be approved by FLH prior to the test.

C. Pile Lengths

Some contracts may specify the order lengths of piles, or minimum tip elevations, but normally the Project Engineer must furnish order lengths based on the test piles (dynamic formula or wave equation analysis) and/or load tests. The determination of pile length often involves economic decisions. For example, if the cost of splices is considerable, it may be wise to order slightly excess lengths to minimize splices. Some contracts require the Contractor to determine lengths but provide payment only for the piles actually driven.

D. Piling Hammers and Equipment

Proposed pile hammers and equipment must be submitted to FLH for approval prior to driving. Geotechnical personnel should be available to assist in evaluating equipment. Hammers must be large enough to assure some penetration (usually at least 3 mm per blow) at the design bearing; however, too large a hammer can damage some piles, or may not be able to reach full energy at the pile capacity. Exhibit 9.4J, Pile Driving Equipment Data Sheet, shows the information required to approve pile driving equipment.

9.4.20.2 Construction Inspection

Pile driving requires essentially continuous inspection in order to verify bearing.

A. Equipment

Check hammer weight, cushion, leads and pile alignment.

B. Preparation

Have the Contractor mark piles and provide a stationary scale on the leads in order to monitor penetration. The inspector should have computed or otherwise know the minimum blows per 25 mm necessary for design bearing.

C. Driving

The hammer must operate at full stroke in order to attain the specified energy. This is important when determining the blow per 25 mm from which bearing capacity is determined. Low pile resistance may initially cause the hammer to function at less than full energy. Exhibit 9.4I, Pile Driving Record is a convenient form for recording pile driving information.

Once a pile has reached design tip elevation and the specified bearing has not been reached, it may be prudent to wait a period of time and try driving again. Often, in granular soils, consolidation will have taken place and bearing will have been achieved.

D. Splicing

Splicing procedures must be approved and splicing must be performed in a skillful manner. Welding, in particular, must be performed under controlled conditions by a certified welder.

E. Drilled Piles

Some piles must be drilled or augered. Examples are concrete piles that are cast in place, and some steel and concrete piles that are predrilled to a specified tip elevation, or installed in a newly constructed embankment.

If the specifications require drill holes and casings to be inspected, the Contractor's QC plan should cover most of this effort. Minimum embedment in rock may be a specified criterion. Periodically the inspector should make verification inspection and the Contractor should be asked to furnish assistance.

Often, cast-in-place piles must be cast in a dry casing or hole. This can require difficult sealing and dewatering.

9.4.20.3 Measurement

Measurement requirements depend on how pile related contract items are structured. The specifications must be read carefully before setting up a documentation system. Generally, all piles ordered by the Government must be paid for, but if the Contractor is required to determine order lengths only pile lengths driven are paid for.

Often splices are paid for, but not always. Usually splices in piles less than the order length are not paid for.

9.4.20.4 Documentation

Comprehensive documentation is necessary for all pile driving operations. Following are minimum requirements:

- Pile layout, structure and numbering system
- Type of hammer and other equipment
- Material certifications for piling
- Driving log for each pile
 - Penetration/blow counts
 - Pile lengths
 - Splices
 - Computed tip elevation
 - Computed Bearing

- Summary of Pay Items

9.4.21 Steel Structures

9.4.21.1 Preliminary Review and Approval

A. Shop Drawings

All shop drawings for major steel structures should be submitted for approval to the Bridge Engineer.

B. Fabrication

The Materials Engineer or Bridge Engineer will arrange for inspection of fabrication.

C. Falsework

Falsework for steel structures must be approved as required by Section 9.14.17.

D. Welding

If field welding is required, the Bridge Engineer should evaluate the need for specialized field inspection or testing if appropriate.

E. Bolts

If a calibrated torque wrench is necessary for inspection of high strength bolts, the Project Engineer should arrange for the required calibration equipment.

F. Certifications

All materials must be accompanied by certifications. Structural plate and associated welds should be documented by mill test results and other required tests.

9.4.21.2 Construction Inspection

Intermittent inspection of all operations is normally adequate except for welding and bolt tightening which require comprehensive inspection.

A. Delivered Steel

Upon delivery, steel should be checked for proper documentation including mill test reports, certifications, and inspection reports.

Any significant damage may require repairs. The Bridge Engineer should be consulted if this is the case. Steel should be stored to be protected from the weather. This is especially true if it is to be stored for a long duration. If at the time of erection, excessive mill scale and rust has built up on unpainted bearing surfaces, these surfaces may require sandblasting prior to assembly.

B. Falsework and Erection Equipment

Facilities for erection must be installed to conform to the approved working drawings and erection plan.

C. Erection

All bearing plates and rockers must be placed within acceptable tolerances. Bearing surfaces must match or be ground smooth. Required gaps in expansion joints should be checked prior to securing the fixed end of spans.

D. Bolted Splices

If splice plates are temporarily removed, match marking should be checked to insure proper replacement.

When heavy hexagon bolts and heavy semifinished hexagon nuts are used, a hardened washer must be installed under the bolt head or nut, whichever is the element being turned. Heavy hexagon bolts can be identified by three radial lines, the legend A-325, and the manufacturer's mark on the top of the head. Heavy semifinished hexagon nuts can be identified by three circumferential marks, or by the number "2"

and the manufacturer's mark on at least one face. The bolts and nuts may be washer faced but these faces do not take the place of a hardened washer.

See ASTM Standard Structural Bolts, for standard markings of A-325 bolts. Washer dimensions can be found in the Standard Specifications.

Calibrated torque wrenches must be used to check all tightening operations. When impact wrenches are used, a constant check should be maintained on the initial phase of the work to ascertain that the bolt tensioning is slightly in excess of the minimum value given in the table on bolt tension and torque values in the Standard Specifications. Once the procedure is satisfactorily established, less frequent checks may be performed if permitted by the Project Engineer.

AASHTO M 164M bolts, nuts, and washers are used with AASHTO M 183M steel and other steels which are to be painted. AASHTO M 253M bolts, nuts, and washers are to be used with AASHTO M 222M steels. M 253M bolts are manufactured of steel, which is more corrosion resistant than M 164M.

The Contractor is required to conduct quality assurance checking the torque of bolts in each connection. Generally, not less than 10 percent or two bolts per connection should be checked. Quality assurance checking must be in the presence of the Engineer.

E. Welding

All field welding must be performed by welders certified for the specific types of welds to be performed. The Project Engineer may request documentation of welder certification.

F. Painting

See Section 9.4.22.

9.4.21.3 Measurement

Structural steel is always paid by lump sum or plan quantity. No remeasurement or computations are necessary. If an error is discovered or change is made, weights specified in the AISC Manual of Steel Construction, may be used to compute changes. However, it is likely some additional cost data may be necessary to more accurately assess the increase or decrease in the Contractor's costs.

9.4.21.4 Documentation

Mill test reports, certifications and shop inspection reports are required for all structural steel. Diary entries made during erection of steel should indicate all problem areas and solutions.

The systematic means of checking bolt tightening should be documented.

9.4.22 Painting of Structures

9.4.22.1 Preliminary Review and Approval

Paint certifications must be provided prior to beginning painting.

If color samples and approval of color are required, this must be coordinated with the Contractor and the approving official.

Environmental concerns may have to be addressed, especially if there is nearby private property, traffic, or if lead or other highly toxic paints are used. In any case, the Contractor should be asked how any problems or potential problems will be mitigated.

If removal of old paint is a part of the Contract, the Contractor may be required to test, and if necessary dispose of the debris as hazardous waste. Laws and regulations may put constraints on how such debris is collected and stored prior to disposal. Negative pressure enclosures may also be required. In enclosure workers, and FLH inspectors may have to take special health precautions to address the presence of lead and other toxins.

9.4.22.2 Construction Inspection.

Inspection is normally intermittent at each stage of construction.

A. Surface Preparation

The specifications should contain specific requirements as to surface preparation. Mill scale, dirt, and loose paint must always be removed. Sandblasting of deteriorated areas and perhaps the entire structure may be required. The specific requirements must be reviewed with the Contractor to be sure they are understood. In the event that Steel Structures Painting Council's (SSPC) sandblasting standards are specified, these standards should be obtained for reference. The presence of oil or grease may necessitate a solvent cleaning.

For some paints and conditions, neither surface preparation nor actual painting can be done outside certain ranges of air temperature, humidity, and dew point. For marginal cases the necessary equipment and expertise should be obtained. Generally, final surface preparation and coating application should not proceed unless the surface temperature is at least 3EC higher than the dew point. Or, if a spot on the steel is moistened with a damp cloth, it should dry within 15 minutes if the dew point is low enough to paint.

When there are airborne pollutants in the area (steam, dust, chemicals), additional precautions may be necessary.

B. Equipment

The equipment selected by the Contractor should comply with the specifications, be clean, and in good working order. The equipment used to measure film thickness is usually furnished by the Government. The procedure for determining thickness should be discussed with the Contractor. Initial readings should be taken on bare surfaces and the prime coat to use as a base for measuring subsequent coats.

C. Paint

Mixing of paint together with all specified additives is the single most important operation prior to application. Paint must be mixed until it becomes smooth, homogeneous, and free of surface "swirls" or pigment lumps. All settlement in the bottom of cans must be thoroughly mixed with the liquid.

It is often useful to tint second coats of prime or other intermediate coats in order for the painter to monitor coverage.

D. Paint Application

Paint must be applied in a uniform and consistent manner. Special attention to coverage is necessary in corners, behind stiffeners and bolts. Brush application may be necessary in these areas.

E. Film Thickness

Wet film thickness gauges may be used by the Contractor for process control. Dry film thickness gauges are used by the Inspector for acceptance. Chalk is useful to mark deficient areas. If deficient areas are numerous, the Contractor should be advised that the job is deficient, and ordered to check and correct it; i.e., the Inspector is not obligated to spend many hours identifying deficiencies if it is clear that the job is not ready for acceptance. Remember that the thickness gauge measures total thickness, so it is necessary to establish average readings for the prime coat(s) in order to calculate the thickness of the finish coat.

F. Multiple Coats

When more than one coat is to be applied and dust and pollution are in the air, it may be necessary to clean the surface before each coat is applied.

G. Special Tests

In addition to dry film thickness readings, some projects may require special tests such as pinhole/holiday detection, or adhesive testing (ASTM D-3359). The ASTM test may be obtained from the Materials Engineer. The pinhole/holiday detection test requires special equipment.

H. Samples

Although paint is normally accepted by certification, FLH may, at its discretion, take samples and have them tested (usually commercially).

9.4.22.3 Measurement

Painting is normally a subsidiary obligation or paid as a lump sum. That being the case, no measurement of quantities is necessary. Changes or added quantities may be negotiated based on changes in areas painted.

9.4.22.4 Documentation

Certifications are required for all paint. Certifications and paint containers should be marked as to lot number and date of manufacture. The contract may require specific test data supporting the certifications.

For surface preparation, the IDR's should document inspection results and approvals. Photograph of passing and failing surfaces are helpful. Photographs of corners, splices, bolts and other hard to clean areas are more so.

The Project Engineer should maintain documentation of the intermittent inspections leading up to the dry film thickness measurements after each coat. The results of dry thickness readings should be documented as well as retesting (if necessary) and final acceptance.

9.4.23 Rehabilitation of Concrete Structures

9.4.23.1 Preliminary Review and Approval

Rehabilitation specifications are normally detailed and method oriented. The Project Engineer should go over them in detail with the Contractor to establish necessary controls at each phase. There are normally areas shown on the plans designated for removal or corrective action. The Project Engineer must ascertain if these are "estimated" areas requiring extensive rechecking prior to authorizing the Contractor to proceed with the work, or if they have already been checked and it is acceptable to begin work.

All materials and equipment used by the Contractor are usually subject to approval prior to commencement. Traffic control procedures must also be reviewed in detail to determine if all potential problems have been properly anticipated. Equipment approval is particularly important because if such equipment is too heavy or too large it may damage additional portions of the structure as defective areas are removed.

When the specifications say "all unsound concrete is to be removed", it is important to reach an understanding with the Contractor as to who has the authority to designate this concrete. If the Contractor can perform responsibly, there is nothing wrong with giving Contractor QC personnel limited authority to expand designated areas if they are defective, with the understanding that such areas will be added to pay quantities. If, however, the Government wants to retain complete control of the removal process; it will be necessary to assign Inspectors to the operation nearly full time to approve removal or to expand areas as necessary.

In any case, it is important to discuss these problems and reach at least tentative understandings before work begins.

9.4.23.2 Construction Inspection

Inspection required for rehabilitation work is nearly continuous. Problems, changes, and the frequent necessity to approve each stage of the work necessitate this.

A. Bridge Decks

Removal operations, using approved equipment, must remove all defective concrete without significant damage to the structure. Milling must be deep enough to accommodate the overlay. Defective areas

must be identified by sounding or more sophisticated procedures. Usually two stages are necessary: one to identify initial removal areas and one to check/or identify additional areas.

The Construction Operations Engineer and the Bridge Engineer (designer) should be apprised if the conditions during removal are drastically different from conditions depicted in the contract.

Joints, reinforcing steel, and miscellaneous hardware often require repair, and the actual conditions are often not as depicted in the plans.

Replacement concrete should be inspected as required by Subsections 9.4.17.1 and 9.4.17.2 as modified by any additional requirements in the contract.

B. Concrete Pavement

The contract normally has specific requirements as to slab removal, replacement, and sealing. As with bridge decks, it is necessary to respond to conditions as they actually exist if those conditions are different than those depicted in the plans.

Repair of expansion joints in concrete pavement is particularly important. Dowels which are out of line or installed improperly will defeat the purpose of the repair work.

9.4.23.3 Measurement

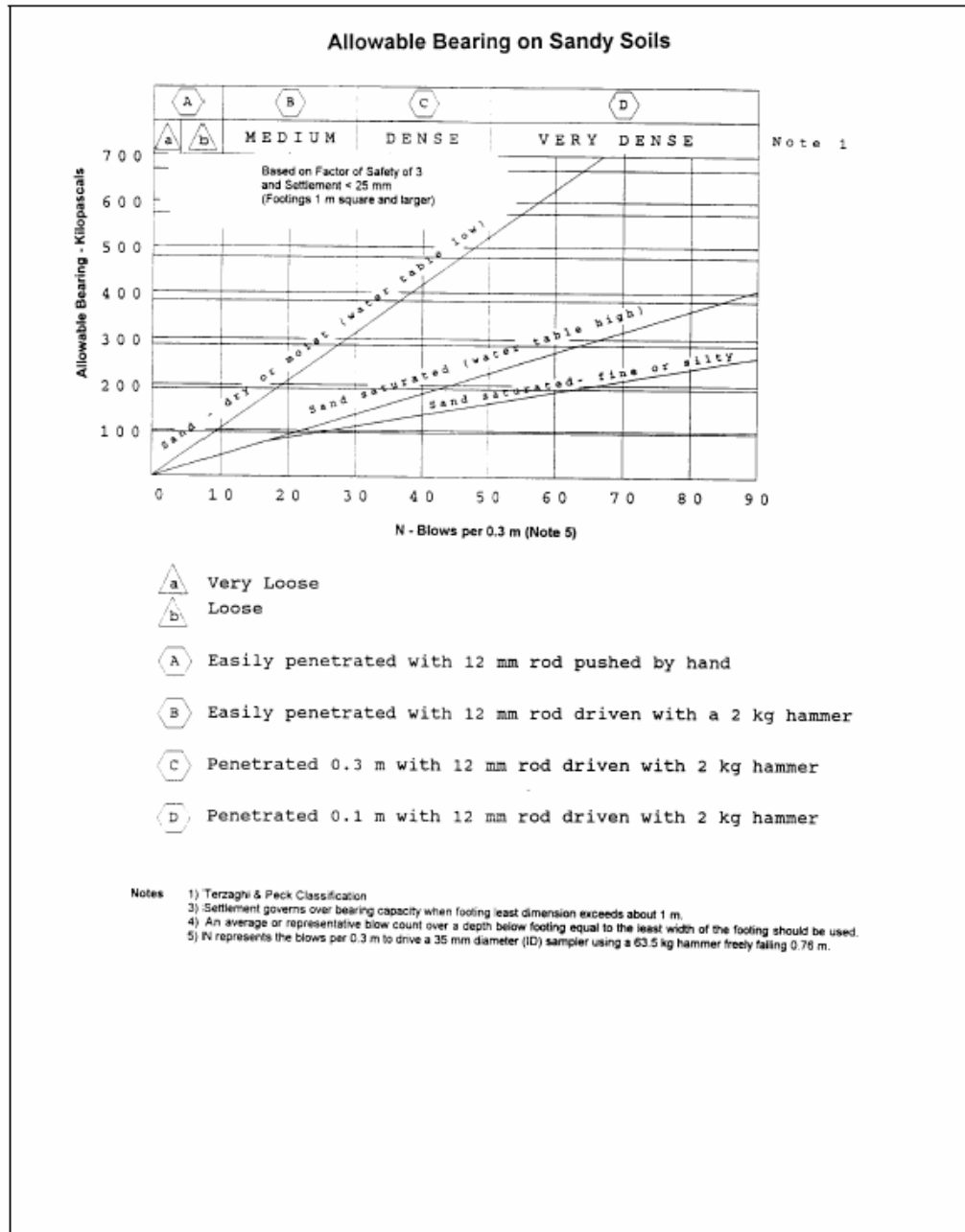
The contract will normally have a wide variety of pay items for rehabilitation work. The most important consideration is the determination of how additional quantities will be measured; i.e., will the Contractor have authority to perform numerous quantities of additional work and expect that work to be measured for payment. Or will only the Engineer have authority to authorize additional work. The answers are different for different situations, but understandings should be reached before work is started.

9.4.23.4 Documentation

Complex documentation is required for rehabilitation work. Removal, replacement, and repair items must be documented in detail, usually with drawings or sketches.

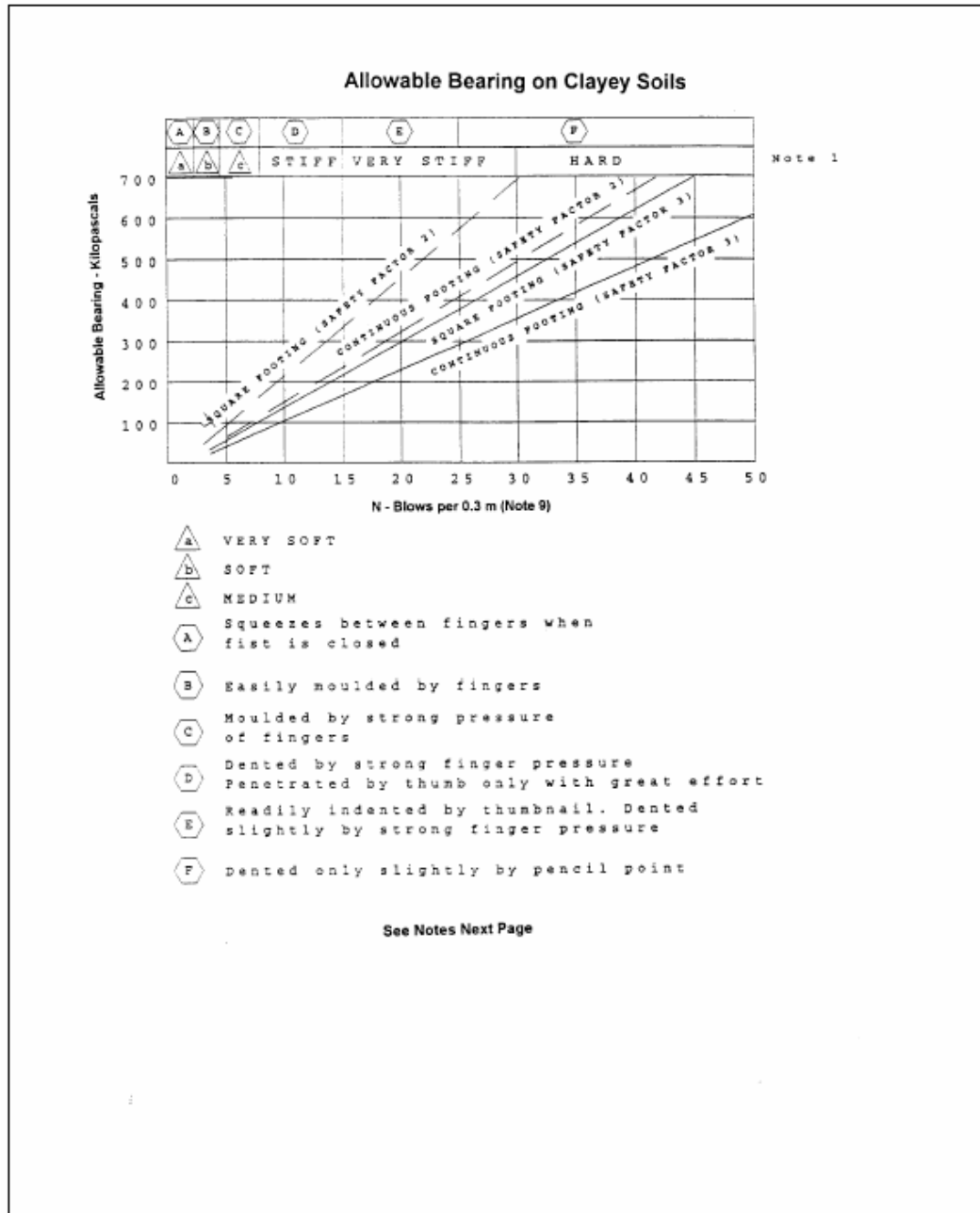
All material must be documented with certifications or test and inspection results.

Photographs are particularly important for rehabilitation work because they provide good feedback so that future designs can be improved.



Allowable Bearing on Sandy Soils

Exhibit 9.4A



Allowable Bearing on Clayey Soil

Exhibit 9.4B

Notes

- 1) **Terzaghi & Peck Classification**
- 3) **Weak strata at some distance below footings may in cases cause more settlement than soil layers immediately below the footings.**
- 4) **Desiccation of clay near the surface will result in higher blow counts. An average or representative blow count over a depth below footing equal to the least width of the footing should be used.**
- 5) **For same unit pressure, large footings settle most. This is particularly so where clay strata are involved.**
- 6) **Greatest settlements may generally be expected at centers of loaded areas.**
- 7) **Consolidation and settlement tend to increase with the following:**
 - Softness of the clayey material.
 - Thickness of the compressible strata.
 - Closeness of clay stratum to ground surface.
 - Amount proposed loading exceeds past loading.
 - Width of footing or loaded area.
 - Height of water table.
 - Liquid limit.
 - Time.
- 8) **Shear failures are most apt to occur when:**
 - Footings are small.
 - Settlements are large.
- 9) **N represents the blows per 0.3 m to drive a 35 mm diameter (ID) sampler using a 63.5 kg hammer freely falling 0.76 m.**

Allowable Bearing on Clayey Soils (Continued)**Exhibit 9.4B**

REPORT OF FIELD CHANGE TO FALSEWORK/FORMWORK

Project: _____ Date: _____

Portion of Structure: _____

Description of Change: _____

Action Taken: _____

Change: ____ Approved By ____ Discussed With _____ Date _____
____ Waiting Approval ____ Contractor Proceeding ____ Work on This Item Suspended
____ Need Decision By _____(Date) ____ See Drawings or Attachments
____ Other Comment: _____

Distribution: Construction Operations Engineer, Bridge Engineer, Project Files

Exhibit 9.4C

CHECKLIST FOR FALSEWORK INSPECTION

Project: _____ Portion of Structure: _____

Partial: _____ Final: _____ Date: _____

A. All Falsework

Item	Insp	Date
1. Approved shop drawings with all appendices and attachments available onsite.		
2. All components identified as consistent with approved drawings. Identification should be by dimensional checks and/or manufacturers model numbers when available. Special grade lumber should be verified by markings. No significant damage (repairs, welds, holes cut, etc.) to any component unless the damage is considered in the design computations		
3. Bearing capacity of footing foundations checked and confirmed consistent with design assumptions.		
4. No standing water or washouts in vicinity of foundations which may have reduced their bearing capacity.		
5. Footings, beams and leveling blocks dimensionally correct and in firm contact.		
6. Elevation adjustments made with full contact shims or paired/property sized wedges.		
7. Columns, towers and vertical members checked for maximum spacing and plumbness in both directions. Plumbness should be within 3.5 millimeters in one meter.		
8. Lateral and diagonal bracing in place and attached per approved drawings.		
9. All components protected from adjacent traffic and construction vehicles.		
10. Tell-tales in place and checked.		

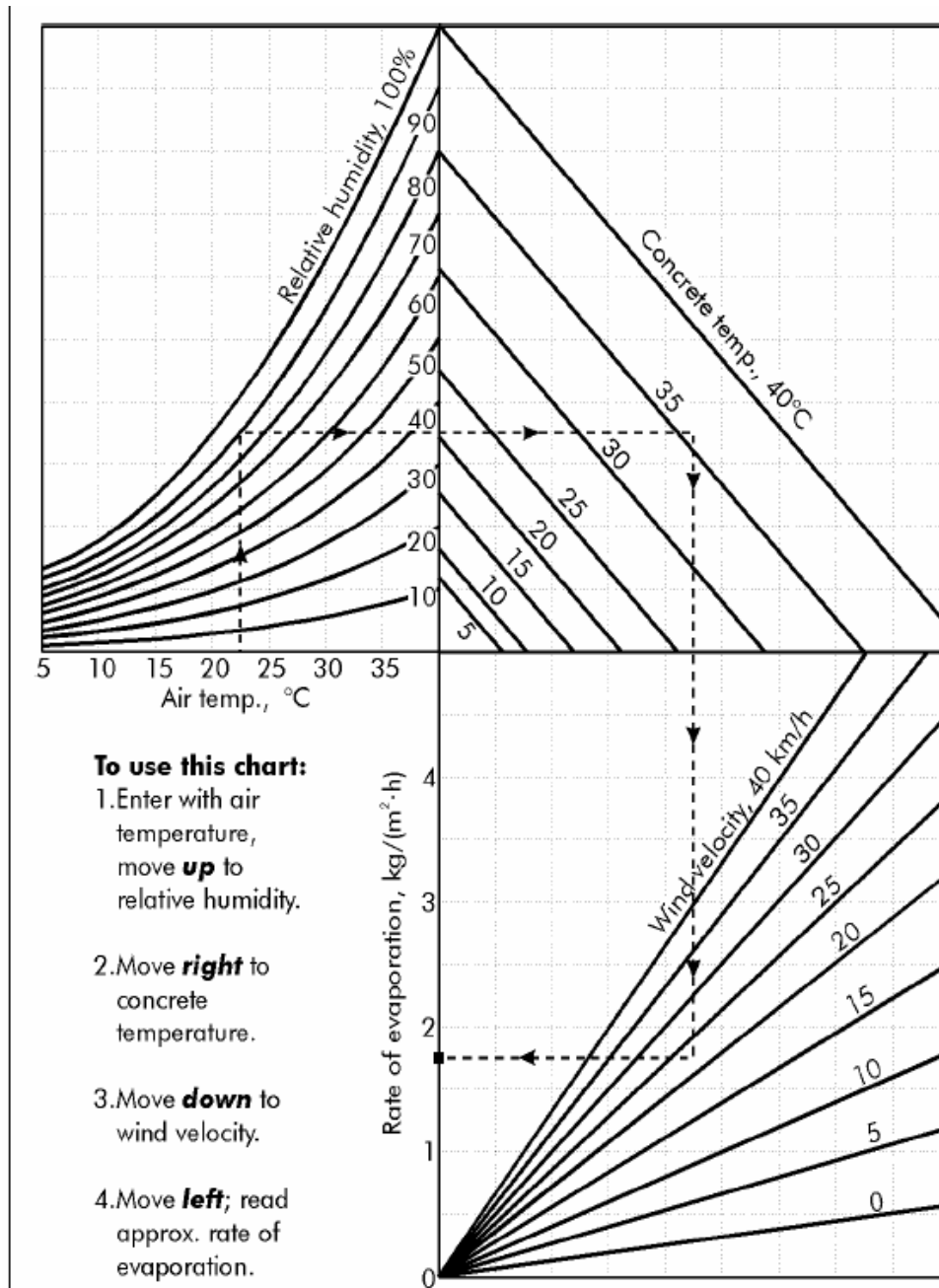
Checklist for Falsework Inspection

Exhibit 9.4D

B. Steel Tower/Screw Jack Falsework

Item	Insp	Date
1. All steel support frames, jacks and assembly parts are in accordance with manufacturer's model numbers and as approved in the falsework drawings. All components are free of dents, bends, cracked welds and corrosion.		
2. Base plates in firm contact with footing or sill, and with decking support system. Plates should be attached if required by the approved drawings.		
3. Adjustment screws snug against frame legs. Alignment devices in place inside legs to prevent rotation. Screws not over extended.		
4. No gaps between adjacent tiers of frame legs. If gaps cannot be closed by adjustment screws without putting the frame out of plumb, the frame may be out of square and should be replaced.		
5. Each tier of frames must have cross bracing or diagonal bracing.		
6. Locking devices on bracing are properly closed and tight, and not damaged.		
7. If exterior bracing for lateral stability is required, the devices which fasten this bracing to the frame system must be securely attached in accordance with manufacturer's recommended standards and as required by the approved falsework drawings. Check cable clamps, tubing clamps and timber to steel connections.		

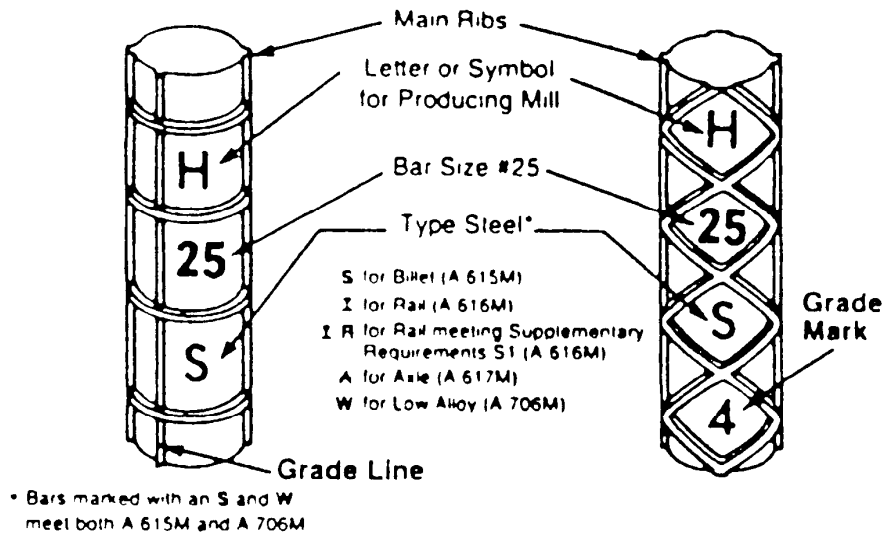
Checklist for Falsework Inspection (Continued)**Exhibit 9.4D**



Note: Example shown by dashed lines is for an air temperature of 22.5°C, relative humidity of 90 percent, concrete temperature of 36°C, and a wind velocity of 22.5 kilometers per hour. This results in a rate of evaporation of 1.75 kilograms per square meter per hour.

Evaporation Rate in Hot Weather

Exhibit 9.4E



Grade 400 and above

Standard Bar Markings

Exhibit 9.4.F

MINIMUM YIELD STRENGTH OR GRADE (f_y)		GRADE MARK
English (ksi)	Metric(MPa)	
40.0		None
43.5	300	None
50.0		None
50.8	350	None
58.0	400	4 or one line
60.0		60 or one line
60.9	420	4 or one line
72.5	500	5 or two lines
75.4	520	5 or two lines

Standard Grade Marks

Exhibit 9.4G

BAR SIZE MARK			NOMINAL DIAMETER (mm)	NOMINAL AREA (mm ²)	NOMINAL MASS (kg/m)
US (Standard) AASHTO M 31, M42 or M53	US (Metric) ASTM A 615M-96a	Canadian (Metric) AASHTO M31M, M42M or M53M			
3	10		9.5	71	0.560
		10	11.3	100	0.785
4	13		12.7	129	0.994
5	16		15.9	199	1.552
		15	16.0	200	1.570
6	19		19.1	284	2.235
		20	19.5	300	2.355
7	22		22.2	387	3.042
		25	25.2	500	3.925
8	25		25.4	510	3.973
9	29		28.7	645	5.060
		30	29.9	700	5.495
10	32		32.3	819	6.404
		35	35.7	1000	7.850
11	36		35.8	1006	7.907
14	43		43.0	1452	11.38
		45	43.7	1500	11.76
		55	56.4	2500	19.61
18	57		57.3	2581	20.24

Standard Bar Sizes

Exhibit 9.4H

Pile Driving Record

PROJECT:						DATE:					
CONTRACTOR:						INSPECTOR:					
STRUCTURE:						PILE LOCATION:					
SAXIMETER NO.:				TIME: START				STOP			
PILE NO.:		PILE TYPE / SIZE:				LENGTH (m):		BATTER:			
GROUND ELEV.:			PILE TIP ELEV.:			CUTOFF ELEV.:					
HAMMER MAKE/MODEL:											
THROTTLE SETTING:				ENERGY/BLOW:				BLOWS/MIN.:			
HAMMER CUSHION TYPE/THICKNESS:											
PILE CUSHION TYPE/THICKNESS:											
DEPTH (0.25m)	BLOWS (/ 0.25m)	STROKE / PRESSURE	DEPTH (0.25m)	BLOWS (/ 0.25m)	STROKE / PRESSURE	DEPTH (0.25m)	BLOWS (/ 0.25m)	STROKE / PRESSURE	DEPTH (0.25m)	BLOWS (/ 0.25m)	STROKE / PRESSURE
0.25m											
1.00m			8.00m			15.00m			22.00m		
2.00m			9.00m			16.00m			23.00m		
3.00m			10.00m			17.00m			24.00m		
4.00m			11.00m			18.00m			25.00m		
5.00m			12.00m			19.00m			26.00m		
6.00m			13.00m			20.00m			27.00m		
7.00m			14.00m			21.00m			28.00m		
REMARKS:											

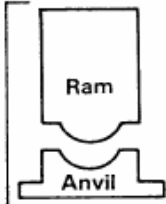
Pile Driving Record

Exhibit 9.4I

Pile Driving Equipment Data Sheet

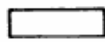
Contract No.: _____ Structure Name and/or No.: _____
 Project: _____ Pile Driving Contractor or Subcontractor: _____
 County: _____ (Piles driven by)

Hammer Components



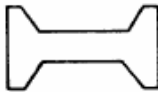
Hammer

Manufacturer: _____ Model: _____
 Type: _____ Serial No.: _____
 Rated Energy: _____ at _____ Length of Stroke
 Modifications: _____



Capblock
(Hammer
Cushion)

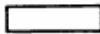
Material: _____
 Thickness: _____ Area: _____
 Modulus of Elasticity - E _____
 Coefficient of Restitution-e _____



Pile Cap

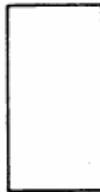


Weight: _____



Pile
Cushion

Cushion Material: _____
 Thickness: _____ Area: _____
 Modulus of Elasticity - E _____
 Coefficient of Restitution _____



Pile

Pile Type: _____
 Length (in Leads) - _____
 Weight/meter _____
 Wall Thickness: _____ Taper: _____
 Cross Sectional Area _____
 Design Pile Capacity: _____ (Tons)
 Description of Splice: _____
 Tip Treatment Description: _____

Note: If mandrel is used to drive the pile, attach separate manufacturer's detail sheet(s) including weight and dimensions.

Submitted By: _____ Date: _____

Pile Driving Equipment Data Sheet

Exhibit 9.4J

9.4 CONTRACTUAL REPORTING DOCUMENTS

9.4.1 Ink, Whiteout, Etc.

All project documentation is to be done in dark ink, including all submittals being turned in by the construction Contractor.

Do not use or allow red ink on anything that will become part of the project records. Only the Contract Administration Specialist, who will audit all project records and make their own notations, reserves this color for use.

Do not use or allow the use of “whiteout” on any project records.

Use “√” when checking submitted Contractor documents. They are used to indicate the correctness of computations and quantities on pay notes, and the agreement of hours and statements made by the Contractor on the Contractor’s Daily Records of Construction Operations and quality assurance/control report.

9.4.2 Contractor’s Daily Record of Construction Operations

Section 153 of the Contract requires the Contractor to prepare a Contractor’s Daily Record of Construction Operations, WFLHD 465, (Exhibits 9.4A and 9.4B) for each day that work is performed on the project. It is critical that the form be completed with enough detail to determine what items were worked on that day, the locations of work, the equipment and labor crews (hours and description of equipment and labor), the weather, who performed the work (name of prime or subcontractor), brief comments about the work that day, any issues that arose, and quantities of work completed.

The Contractor is required to provide the Contractor’s Daily Record of Construction Operations within one working day. It is very difficult to “catch up” one the Contractor gets behind in providing this documentation, so be diligent in requiring the reports each day.

An appropriate person with knowledge of the daily work (Project Engineer or Inspector) should review the Contractor’s Daily Record of Construction Operations and sign it if it’s acceptable. Provide a copy to the Contractor, and file the original in the project office files. It is important that the daily sheets be made out and agreed to as soon as possible so that any differences may be resolved at the time the work is performed.

If the Contractor’s Daily Record of Construction Operations has errors, diligent effort should be made to reconcile any differences in the content of the report with the contractor so that the report may be bilaterally agreed to. On the occasion that agreement cannot be reached, the original should be annotated as to details of the disagreement and a copy will be returned to the contractor.

9.4.3 Daily Quality Control and Quality Assurance Report

The Contractor Quality Control and Quality Assurance Report is where the outcome of the QC/QA plans actualization and results are documented. It is a separate report that is for the Contractor’s Quality Manager to document and attach details of all quality control and assurance activities. It should not duplicate information found on the Contractor’s Daily Record of Construction Operations. Test reports, WFLHD-470 forms and results of other reviews, inspections, measurements and process or method

adjustments should be included or attached. The Contractor Quality Control and Quality Assurance Report does not need to describe the work locations, except to the extent the locations are necessary to describe the QC/QA activities. The Contractor Quality Control and Quality Assurance Report should not list daily production or inefficiencies of the operations. That information should be included on the Contractor's Daily Record of Construction Operations.

Look for reports that are factual and concise as to specific QC/QA activities. Reports that simply parrot the contractor's activities in general that are not related to QC/QA are of no value. Reports that provide descriptions of QC/QA personnel that only describe individuals daily whereabouts are not of much value. Reports that specifically speak to individual components of work that had QC/QA related activities associated with them are of value.

On smaller projects with fewer activities the Daily Quality Control and Assurance Report may be combined with the Contractor's Daily Record of Operations.

9.4.4 Notification of Completion of Work, WFLHD-470



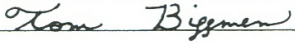

Section 153 of the Contract also requires the Contractor to complete a Notification of Completion of Work. When a phase or element of work is completed, the Contractor initiates "acceptance" of the work by submitting a Notification of Completion of Work form, or WFLHD-470 (Exhibit 8.4C). Acceptance, as used in terms of the WFLHD-470, means that the Government has, to the best of their knowledge, found the element of work to be in compliance with the Contract, and that the Contractor may proceed with subsequent work.

Once the Contractor submits the WFLHD-470 form, the Project Engineer inspects the work shown on the WFLHD-470 form, and marks the appropriate responses and makes any necessary comments. The WFLHD-470 is then returned to the Contractor. If there are no deficiencies then the Contractor may proceed with the work. If there have been deficiencies identified then the Contractor must correct them before continuing. This process should be expedited to ensure the Contractor is not being held up unreasonably. The contract usually allows 24-hours for this process.

When rejecting work for either unsatisfactory materials or workmanship, the cause for rejection should be documented and photographed if appropriate. The contract provision or specification being violated should also be clearly documented.

For projects managed by contracted Construction Managers

Specific field office requirements are provided in the *Construction Management for Highways/Bridges Contract*. Once the Contractor submits the WFLHD-470 form, the Construction Manager inspects the work shown on the WFLHD-470 form, and marks the appropriate responses and makes any necessary comments. The WFLHD-470 is then scanned and e-mailed to the Project Manager along with comments explaining what the WFLHD-470 is for, what inspections were done, the reasons for the marked responses on the form and a recommendation for signing the approval or rejection of the work. The Project Manager will review the documentation and either call for more information and/or details or attach an electronic signature and return the WFLHD-470. The WFLHD-470 is then returned to the Contractor. If there are no deficiencies then the Contractor may proceed with the work. If there have been deficiencies identified then the Contractor must correct them before continuing. This process should be expedited to ensure the Contractor is not being held up unreasonably. The contract usually allows 24-hours for this process.

WFLHD-465 (Rev. 10/90) 	U. S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION WESTERN FEDERAL LANDS HIGHWAY DIVISION	 FEDERAL LANDS HIGHWAY <i>Commitment to Excellence</i>	DESCRIPTION AND LOCATION OF WORK (PLEASE BE CONCISE) (A) - Mason Dam approach - Haul, Place, Process aggreg. Item 30110 (B) - Mowich Loop - Place paving Item 40201 (C) - Tailings Overlook - Process aggregate Item 30110 (D) - (E) - (F) - (G) - (H) - (I) - (J) - (K) -																
CONTRACTOR'S DAILY RECORD OF CONSTRUCTION OPERATIONS ELKHORN DRIVE SCENIC BYWAY PROJECT: <u>OR PFH 113-1(2)</u>			<div style="border: 2px solid black; padding: 10px; transform: rotate(-15deg); font-weight: bold; font-size: 1.2em;"> RECEIVED SEP 13 1998 BY PROJECT ENGINEER </div>																
CONTRACTOR/SUB-CONTRACTOR: <u>XYZ Paving, Inc.</u>																			
DATE: <u>9-12-98</u> DAY: <u>Saturday</u> WEATHER <u>Sunny, 80 F</u>																			
			SHIFT: 0700 TO: 1730																
NO:	LABOR CLASSIFICATION:	NO:	EQUIPMENT TYPE:	PRODUCTION TIME: (MAN HOURS WORKED)											EQUIPMENT TIME				
				(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	WORK	IDLE	DOWN		
1	Teamster, Gp. 3	1	10-CY End Dump w/pup, #B-11	8	2												10	0	0
1	Teamster, Gp 3	1	10-CY End Dump, #B-10	9													9	0	1
1	Teamster, Gp. 3	1	10-CY End Dump, w/pup, #B-15		10												10	0	0
3	Oper., Group 2	3	25-Ton Vibratory Roller, Bomag	10	10	10											30	0	0
2	Op., Gp. 4	2	Grader, Cat 16G	10		10											20	0	0
1	Op., Gp.2	1	Blaw Knox Laydown Machine		10												10	0	0
1	Teamster, Gp. 6	1	14.0 m3 Water Truck, #W-22	4	2	4											10	0	0
2	Labor, Gp. 3				20														
1	Superintendent			2	6	2													
1	Q.C. Manager			1	8	1													
1	Paving Foreman				10														
<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center; margin: 0;">EXAMPLE FHWA FORM 465</p> <p style="text-align: center; margin: 0;">CONTRACTOR'S DAILY RECORD OF CONSTRUCTION OPERATIONS</p> <p style="text-align: center; margin: 0; font-size: 0.8em;">The construction contractor will complete and submit this daily, and the CI will check and verify it (corrections may be necessary). This is an important legal document, as it becomes the official record of the construction project.</p> </div>																			
CONTINUE TO BACK OF SHEET																			
BY: <u>Tom Biggmen</u> SIGNATURE FOR CONTRACTOR (*) 										REVIEWED BY: <u>Jack Phillips</u> SIGNATURE, PROJECT ENGINEER OR INSPECTOR: 									
DATE: <u>9-12-98</u>										DATE: <u>9-13-98</u>									
(*) IT IS HEREBY CERTIFIED THAT THE INFORMATION CONTAINED IN THIS RECORD IS ACCURATE, AND THAT ALL WORK DOCUMENTED HEREIN COMPLIES WITH THE REQUIREMENTS OF THE CONTRACT. ANY EXCEPTIONS TO THIS CERTIFICATION ARE DOCUMENTED AS PART OF THIS RECORD. ALSO, I CERTIFY THAT ALL CONSTRUCTION SIGNING AND TRAFFIC CONTROL (INCLUDING TEMPORARY STRIPING) IS CORRECT FOR THE STATUS OF THE PROJECT AND IS IN FULL CONFORMANCE WITH THE "MUTCD" AND THE CONTRACT REQUIREMENTS FOR THE PROJECT IDENTIFIED ABOVE.																			

CONTRACTOR'S DAILY RECORD OF CONSTRUCTION OPERATIONS (front page)
Exhibit 9.5 A

EQUIPMENT MOVE-IN/MOVE-OUT				
EQUIPMENT:			DATE:	
TYPE:	MAKE:	MODEL/SIZE:	IN:	OUT:
Grader	Cat	16G	9-12-98	
Grader	Cat	16G	9-12-98	9-12-98
Laydown Machine	Blaw Knox	PF-3200	9-12-98	
Roller	Bomag	DD-2500	9-12-98	
Front End Loader	Cat	966	9-10-98	9-12-98
<p>EXAMPLE FHWA FORM 465 CONTRACTOR'S DAILY RECORD OF CONSTRUCTION OPERATIONS</p> <p>The construction contractor will complete and submit this daily, and the CI will check and verify it (corrections may be necessary). This is an important legal document, as it becomes the official record of the construction project.</p>				
REMARKS:				
Started paving operation today, while continuing to haul and process gravel at two other sites. Completed processing gravel item at Tailings Overlook--will have surveyors red-top in the morning.				
USFS visited project and began their own seeding operation (our subcontractor will mulch next week)				
Weekly safety meeting was held today, attended by all employees and FHWA inspector.				
Erosion control devices were checked at all project sites.				
Traffic control devices were checked and cleaned at Powder River site.				
<p style="font-size: 2em; transform: rotate(-15deg); opacity: 0.5;">RECEIVED</p> <p style="font-size: 1.5em; transform: rotate(-15deg); opacity: 0.5;">SEP 13 1998</p> <p style="font-size: 1.2em; transform: rotate(-15deg); opacity: 0.5;">BY PROJECT ENGINEER</p>				
ACCIDENTS	PRODUCTION SUMMARY (Loads, Tons, Cu. Yd. Lin. Ft., etc.)			
YES _____ NO <input checked="" type="checkbox"/>	ITEM NO.	STATION TO STATION	QUANTITY	
UNSAFE OPERATIONS	30110	Mason Dam Boat Ramp Approach	450	
YES _____ NO <input checked="" type="checkbox"/>	30110	Tailings Overlook	200	
INTENTIONALLY LEFT BLANK	40201	Mowich Loop	700	

This form was electronically produced by Ellis Federal Forms, Inc.

CONTRACTOR'S DAILY RECORD OF CONSTRUCTION OPERATIONS (back page)
Exhibit 9.5B

WFLHD 470

Notification of Completion of Work

Date/Time: _____

Project: _____

Item Number: _____ Item Description: _____

Location: _____

I certify that the work identified above has been completed according to the contract requirements and checked for compliance. I further certify that I am qualified and designated, in writing, to perform this Quality Control/Assurance function on this project.

Name (printed)_____
Signature

Remarks:

 [FHWA use below line]

If box one or two is checked, the contractor can proceed immediately with the next phase of work.

Received by: _____ (name: signature/print) _____ (date/time)

1. This work will not be inspected.
2. This work was inspected and no deficiencies were found.
3. This work was inspected and deficiencies were found as noted below. The contractor must resubmit a WFLHD 470 upon correction of this work.
4. This work was inspected and deficiencies were found as noted below. The contractor can proceed with the next phase of work as noted below.

Remarks:

Completed by: _____ (name: signature/print) _____ (date/time)

Returned to Contractor by: _____ (name: signature/print) _____ (date/time)

Save Data Only Clear Form Save Form & Data Email Form Retrieve Data

NOTIFICATION OF COMPLETION OF WORK, WLFHD-470**Exhibit 9.5C**

9.5 PROJECT DIARIES

9.5.1 Responsibility

Federal Regulations generally allow inspection of public records, such as Government diaries, by the Contractor and even the general public. Certainly, all entries should be made as if the Contractor and others involved in the contract will eventually see them.

In maintaining these reports, project personnel must be consistent in recording the events and activities on the job, particularly those relating to claims or potential claims. The failure to record an event, once the responsibility of a daily diary is undertaken, carries with it the implication that the event did not occur or was insignificant and also threatens the credibility of the entire log.

It is mandatory that the Project Engineer and each inspector maintain a daily diary. Diaries are considered an official government document and must be turned in with other project records at the conclusion of a project. This is also applicable to any retained voice recordings.

For projects managed by contracted Construction Managers

The Project Manager must also keep a separate diary for each project they are overseeing. A diary entry is required for any day in which the Project Manager does work or has dealings related to the project.

9.5.2 Purpose of the Diary

The purpose of project diaries is to document work progress, site conditions, and the Contractor's ability (or inability) to perform its work so that WFLHD has valuable information necessary to accurately reconstruct the events of the project in preparation of a claim.

9.5.3 Diary Format

Two options are available for keeping diaries, bound books or computer generated diaries. When using bound books, all diary entries should be written in ink. When using the computer, a hardcopy of the daily diary must be printed, signed, and filed at the end of each day.

The Project Engineer may find a voice recorder helpful, either for recording notes to be used at the end of the day in making diary entries, or for recording events, which can later be transcribed into the diary and signed by the Project Engineer. Have discretion when using the voice recorder. Strive to record what is necessary, not a play-by-play description of all events that happened in a day. It may be helpful to file certain tapes regarding claims and disputes in addition to the transcription. If this occurs, there should be a notation in the diary or in the transcription.

9.5.4 Information to Record in the Diary

Diary entries should be factual, concise, complete, and legible. Entries should avoid vague generalizations like, "Contractor operations remain inefficient." State why they are inefficient and how long they have been that way. If there is a dispute in, say, interpretation of the specifications, try to

express both (Government's and Contractor's) points of view. When a decision is made, or agreement reached on further action, state the outcome. If no agreement was reached, state what instructions were given to the Contractor. If an opinion is included, identify as an opinion, not fact. Diary guidelines and examples are provided on the following pages.

The information shown in the following list shall be included, as appropriate, in each diary entry. Remember, the purpose of the diary is to document the project operations, not what you (Project Engineer or inspector) did each day. Each entry must be signed (not initialed) at the end of the day.

- Date and weather conditions (morning and afternoon).
- Work of inspectors. (Note: This only needs to be logged by the Project Engineer and should just be a brief entry of the inspector's assignments for the day.)
- Names of visitors to the project and purpose of visit.
- Comments on the progress of operations as compared to the Contractor's approved schedule.
- Explanations of why work was not started or completed as planned by the Contractor.
- The substance of important conversations with the superintendent, Contractor employees, Subcontractors, suppliers concerning conduct, progress, changes, interpretation of specifications, or other details.
- Comments on construction safety hazards and corrective measures.
- Discussion of erosion control and other environmental concerns as appropriate.
- Information concerning accidents occurring on the project or incidental to the construction work.
- Comments on traffic control and signing.
- Any information not covered in other notebooks that might have a bearing in case of future disagreement, such as difficulties encountered in construction and their causes, delays caused by breakdowns of equipment, comments relative to improper use of equipment reflecting inefficient operations by the Contractor, etc.

9.5.5 Information to Record, But NOT in the Diary

In order to properly evaluate the *Contractor's Daily Record of Construction Operations*, the inspectors should keep some form of notes that document the Contractor's labor, equipment, and work areas. The Project Engineer or Inspectors may use FHWA Form 1413, *Inspector's Daily Record of Construction Operations*, or another format as agreed by the COE. In any case, the information used to validate the *Contractor's Daily Record of Construction Operations* **should not be recorded on the same sheet as the inspector's diary**. While the inspector's diary will be retained indefinitely by FHWA, the inspector's notes (of Contractor's labor, equipment, and work areas) for that day will be discarded once the *Contractor's Daily Record of Construction Operations* is signed by the Project Engineer. It is not necessary to document every hour worked by the Contractor; the inspector's notes just have to be of sufficient detail to review, and accept or reject the *Contractor's Daily Record of Construction Operations*.

Field measurements and notes for documenting monthly progress estimate quantities should not be recorded in the project diary.

9.5.6 Things to Record in the Diary

- **Identify problem and possible cause.**
 - At the crusher at 3:00 a.m. Talked with foreman Russ. Production is a lot slower due to the material pushed down by D8N dozer. There are very little fines. The jaw isn't big enough to handle straight rock and still get production.
 - Mike claimed he had only 20, 000 yd³ of waste in the pit. In my opinion there is twice that much in it. XYZ Construction Company is scrambling for disposal volume because of failure to decrease the slash volume by burning.
- **Identify what happened and the ramifications.**
 - Crushing operation is going well. The loader operator let the feeder run out at 11:00 p.m. while he was stockpiling. This will cause some inconsistency in product. The crusher is crushing 20408A material.
- **Note how operation is not consistent with the Contractor's approved changes.**
 - From 12:20 p.m. to 1:20 a.m. I observed WA500 feeding Pugmill. I noticed no change in pattern for getting rock from stockpile. The loader operator is taking rock from the east end of the stockpile. I have yet to see him get a bucket of rock from the edge of the stockpile like XYZ Construction Company said in the letter they wrote.
- **Identify what is occurring and why it is not correct. Also reference pictures.**
 - The two 10-cy trucks began haul of Select Topping to 563+00 back - This area again has not been approved for placement. Picture #19 - sta. 558 ahead.
- **Record why a scheduled operation isn't going to occur.**
 - No gravel haul tonight because no areas are ready for Select Topping or base rock
- **Record problems with operation, source of the material, and impacts to the operation.**
 - At the crusher site there are clay balls coming off of the product belt. The sta.800 material is wet and the fines seem to have plugged the scalping screen.
- **Identify how operation is contributing to non-spec material**
 - At 4:15 pm the Sylvan crusher was producing 30101 base and the material was dropping on the cone-shaped stockpile of out of spec. aggr.-see previous page—photos
- **Record improper testing techniques and inadequate testing.**
 - 5:50 at Lab Trailer - observed Todd do P.I. test. He did it wrong. He took about a 20-gram sample, rolled part of it, and put the whole thing in a tin. Before this, he worked the material quite a bit with his hands, looked like he was trying to work moisture out that way.
- **Record testing problems.**
 - 1) Lloyd says large square No. 4 screen is out of Spec.; 2) Mechanical shaker motor appears to be going out; also the base is not sufficiently anchored to work properly; 3) Outside dryer still not working (I was told it was but it's not); 4) Air conditioner doesn't

work adequately to maintain proper temperature to run S. E. tests. All these things need attention but testers refuse to tell XYZ Construction Company about them so they can be fixed. He says when the tests start failing XYZ Construction Company will be interested in finding out why.

- **Record tester's abilities and techniques.**
 - Tom the tester took some density tests. FHWA Inspector said Tom the tester did not know what he was doing. He **wasn't using the right proctor; he was testing 2" down** into subgrade. I talked with Mr. Mitre and found out he had **very little if any experience with a nuclear gauge**. He also said **he never pounded a proctor**. From talking with him it sounds like his specialty is in **roof inspection**. Also while talking with Tom the tester I asked him how they split their half of the sample and he said they **used the mechanical splitter**. Just before this he said that they thought the mechanical splitter was out of spec. due to loose dividers.
 - Tom the tester also tried to take some density tests in the ± 870 area. He **didn't know the maximum or optimum moisture content**. He took ± 10 minutes trying to figure out how to change the depth.
- **Identify what was checked, what stations, and how much it was in/out of spec.**
 - Check subgrade at centerline and shoulders, stations 510+49 & 511+99. It's just 0^{101} to 0^{251} off--out of spec.
- **Note Contractor's performance and attitude.**
 - At 4:30 the culvert crew backfilled the lower sections of the culvert at 769+41. I reminded Claude that the part in the roadway was hastily covered with a 2-3' lift, temporarily, and will have to be dug and compacted sometime - tonight or later. (Thinking that already being here makes it easy right now) Claude responded with, "no way I ain't tearing that out, now or ever. We got a test on it and it passed." And he walked away.
- **Record Contractor employee's opinion of operation (especially if the employee has a good reputation).**
 - Talked with the crusher foreman. He told me that in 20 years of crushing for XYZ Construction Company, this was the worst ran job he had ever been on. He said there was no organization or coordination between the different operations. He has been trying for three days to get the crusher at Smith Pass setup with no help, no mechanics, and no transportation. Said his crusher operator was quitting tomorrow, and that he was "only half a day behind him."
- **Record disagreements between Contractor superintendent and Contractor employees.**
 - Crusher Foreman also mentioned how he wanted the crusher set up on the south side and the pugmill set up on the north side. But Contractor Superintendent disagreed. Crusher Foreman said under his way he would of had a lot more stockpile room and would be on the side where the plant mix rock would come from. Under the current set-up he is having to build two stockpiles for 20804 rock and will probably have to truck the rock for plant mix.
- **Record conversations with subContractor regarding their thoughts on the project.**
 - Earlier today (about 1:00 p.m.) SubContractor Superintendent stopped to say that signs are not getting put up for his flaggers and that that is **out** of his control. He'll be glad to be done with this job and the total lack of communication.

- **Record what Contractor encountered and whether you agree or disagree.**
 - Contractor Superintendent stated that ice is being encountered at $\pm 7'$ in area 3; reviewed area 3, Contractor Superintendent is correct, ice layer is $\pm 7'$ below surface.

9.5.7 Things NOT to Record in the Diary

- **Do not record information that should be on the Contractor's daily reports.**
 - Select placement Sta. 608 – 580 ± 7 Belly Dumps, 5 End Dumps, 1 Rock Truck, SDJ50, 2 16G Blades.
- **Do not use the inspector's diary to record what you did each day. It should be used to record the Contractor's operation, not yours.**
 - I cleaned the battery terminals on two vans with dead batteries, jump started them, and let them run for 25 minutes to charge. When I turned the key off they still wouldn't start. Bud, Carol, Jeff and I assembled the survey equipment and began learning the data collection system.
- **Do not write a statement unless you can give details and conclusions.**
 - i.e., in the example below, what were the problems and what was proposed to correct them?
 - Chris called with concerns about Contractor's superintendent.
 - **i.e., what screen what out of spec? and what was not computed correctly?**
 - Test results (gradation) are not good - Test results are not computed correctly. We must have good test results.
- **Do not record statements unless the reason for the statement is clear.**
 - Observed 2 Belly Dump Trucks at scale, ready to haul 20408 Rock tonight.

9.6 PHOTOGRAPHS

Photographs are an important part of the project records and should be turned in with the project records at the end of the project. They serve to document the record with respect to slides, cave-ins, floods, and other unusual occurrences; actual conditions when a Contractor alleges *Differing Site Conditions*; unusual construction features or practices; accidents involving death, personal injury or property damage; encroachments within the right-of-way; and other such occurrences and conditions. They are useful in illustrating reports on experimental features and unusual construction practices, final construction reports, and other reports. They are invaluable as evidence in case a controversy develops during the Contract, which results in litigation. They are especially useful when a construction contract encompasses a long period of time, as much as 2 or 3 years. As memories fade and Project Engineer's are transferred to other projects or retire, photographs provide direct evidence of the conditions that existed at the time the dispute arose. The old adage that "a picture is worth a thousand words" applies here.

In order to best serve the intended purpose, a photographic history of all construction projects should be made. Photographs should be taken of the construction site before construction begins, during each stage of construction as it progresses, and of the completed project. For example, during a project on which major excavation is to be accomplished, photographs should be taken on a regular basis (perhaps as often as once a week) to document progress made by the Contractor. Such photographs should be taken from the same location and the camera should be aimed at the same reference point in order that a person looking at the pictures can actually see the progress, or lack of progress, which was made by the Contractor during a certain period of time.

If a project is of sufficient length, the Project Engineer should choose several reference points from which photographs can be taken during the course of a project. Special consideration should be given to those areas along the project length where experience has shown that difficulties may be encountered. For example, if there are unusual rock formations that might be encountered as excavation progresses, that site should be chosen and photographs should be taken on a regular basis.

In addition to photographs taken from specified reference points on a regular basis, photographs also should be taken immediately after unusual occurrences and before unusual conditions are disturbed. The Project Engineer and all inspectors should have, or have easy access to a camera at all times during construction. The Project Engineer should emphasize the use of these resources.

Clarity and good composition are very important, and proper identification is necessary. In some cases, it would be appropriate to have an individual stand by the unusual condition in order that the relative size of the condition may be determined. For prints from film, the photo should be labeled with the name or initials of the photographer, the date taken, and the location. No photo log is required, as long as the pictures are properly identified. For digital photographs, the identification of the subject, the date and the name of the person who took the photo need to be attached to the photo. This can be accomplished via photo managing software or by printing out the photo and writing the information down. In any event, the digital image needs to be identified.

9.7 CONSTRUCTION FEEDBACK REPORT

Feedback is used to obtain information to improve Project Delivery processes, as well as to improve support services to the construction field employees. The Construction Feedback Report (Form WFLHD-81) is used to initiate the improvement process. The report should be used to:

- Identify any problems encountered in the plans, specifications or administration of the Contract
- Identify any problems associated with support services
- Identify any other deficiencies where corrective action or improvements can be incorporated into future projects
- Provide recommendations for future improvement

It is best if the feedback forms are completed as the problems arise, instead of waiting until the end of the project when they become less important and are forgotten.

9.7.1 Instruction for Completing the Construction Feedback Report

- Report Number: Number reports sequentially for the project.
- The Project Engineer completes Item I and Item II (pen or pencil are acceptable), and sends the form to their Construction Operations Engineer (COE).
- The COE completes Item III by reviewing the problems, the corrective action taken and the recommended improvements by the Project Engineer. The COE provides comments, identifies the appropriate office to take action, and forwards the form to the Construction QA Specialist (CQAS). Note: The COE should be as specific as possible when identifying the action office.
- The CQAS forwards the form to the appropriate action office, which completes Item IV by reviewing the problem and the recommended improvements. The office initiates action or provides an explanation for non-action, and returns the form to the CQAS.

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CHAPTER 10

CONTRACT MODIFICATIONS

10.1 OVERVIEW

The following chapter provides guidance and the requirements for developing and processing contract modifications. The Project Engineer is responsible for the tasks listed in the process, except as otherwise noted. Throughout the process, the Project Engineer should coordinate with the COE.

A contract modification is a negotiated acquisition. Part 15 of the Federal Acquisition Regulations (FAR) prescribes the policies and procedures governing negotiated acquisitions. The process outlined on the following pages is based on FAR Part 15, the Transportation Acquisition Manual (TAM), and the Transportation Acquisition Regulations (TAR). The process applies to all contract modifications except contract modifications written to exercise an option (FAR Part 17). The process does not apply to resolution of claims submitted under FAR Part 33.

To the maximum extent possible, a separate modification should be prepared for each situation. Avoid combining multiple unrelated issues in the same modification.

10.2 AUTHORITY

Only contracting officers acting within the scope of their contracting officer warrant are authorized to execute contract modifications on behalf of FHWA. Except for life-threatening or emergency situations, other FHWA personnel or its representatives shall not:

- act in such a manner as to cause the contractor to believe that they have authority to bind the FHWA
- direct or encourage the contractor to perform work that could be the subject of a contract modification

The delegation of authority letter, issued to the contractor between the time of award and issuance of the notice to proceed, identifies the specific levels of authority for a particular project. The Project Engineer has authority to negotiate modifications up to the dollar amount approved by the Contracting Officer in the negotiation memorandum.

For projects managed by contracted Construction Managers

Construction Managers do not have authority to negotiate a contract modification, however, the Construction Manager may be asked to take the lead in the negotiations since they will have the greatest knowledge of the circumstances. The Project Manager will either be present or be available by conference call or some other means for all negotiations.

10.3 CHANGE ORDERS

FHWA contracts contain a Changes clause that permits the contracting officer to make unilateral changes within the general scope of the contract. If halting or impeding the required work would adversely affect the government's interest, a change order should be issued. A change order is a written directive, signed by the contracting officer, requiring the contractor to make a change without the contractor's consent. A change order allows the contractor to proceed with the work even though the terms and conditions of the contract modification have not been definitized. Change orders are not typically forward priced and therefore they require two documents: the change order (using SF 30) and a supplemental agreement reflecting the resulting equitable adjustment in contract terms.

Include the following in the change order:

- scope of work
- a specific timetable for definitizing a bilateral contract modification
- a not-to-exceed estimate of cost which is used to obligate funds for the modification

While issuance of a change order allows the contractor to begin work before the contractor and government have an opportunity to agree on the terms and conditions of the modification, a change order does not negate the process requirements outlined in this chapter. You must still coordinate with FHWA and external parties, develop an approximate cost estimate, and secure an approved procurement request prior to having the Contracting Officer approve the change order.

10.4 TYPES OF CONTRACT MODIFICATIONS

Contract modifications are either bilateral or unilateral. Both types are explained in detail below.

10.4.1 Bilateral Contract Modifications

A bilateral modification (supplemental agreement) is a contract modification that is signed by the contractor and the contracting officer. Bilateral modifications, for example, are used to:

- reflect agreements of the parties modifying the terms of the contract
- make negotiated equitable adjustments resulting from the issuance of a change order
- definitize letter contracts

10.4.2 Unilateral Contract Modifications

A unilateral modification is a contract modification that is signed only by the contracting officer. Unilateral modifications are used, for example, to:

- allow performance and payment of work without agreement on terms and conditions (i.e. price and time) of the modification
- make administrative changes
- issue change orders
- make changes authorized by the Options clause
- issue termination notices

10.5 CONTRACT CLAUSES

The authority to change the contract and make adjustments to the contract amount originates from the various FAR clauses. The majority of contract modifications are authorized by the Changes clause. The Changes clause and the other most commonly used FAR clauses are described below. For more information on any particular clause, contact your COE or refer to *Administration of Government Contracts* by Nash and Cibinic.

10.5.1 FAR Clause 52.243-4, Changes

The Changes clause gives the government the unilateral right to make changes in the work within the general scope of the contract, including changes to the plans and specifications, the method of work, government furnished materials, and the time allowed to complete the contract. The Changes clause also provides the means under the contract for the government to make an equitable adjustment for constructive changes and defective plans or specifications. The term “within the general scope of the contract” is defined as work that “should be regarded as fairly and reasonably within the contemplation of the parties when the contract was entered into.” Changes outside the scope of the contract are referred to as “cardinal changes” and are not within the authority of the Construction Branch.

10.5.2 FAR Clause 52.249-10, Default

The Default clause serves two purposes. First, it allows the government to terminate the contractor’s right to proceed if the contractor has not performed with due diligence, or if the contractor has not completed work within the time specified in the contract. Second, the clause allows for an adjustment to contract time if the contractor or its subcontractor is delayed due to: acts of God or the public enemy, acts of the Government in either its sovereign or contractual capacity, acts of another contractor in the performance of a contract with the Government, fires, floods, epidemics, quarantine restriction, strikes, freight embargoes, and unusually severe weather. Under the Default clause, the contractor is only entitled to time extensions; there is no provision for monetary compensation.

10.5.3 FAR Clause 52.236-2, Differing Site Conditions

The Differing Site Conditions clause provides a remedy for situations where the actual physical conditions at the work site are materially different than either the conditions represented in the contract (Type I Differing Site Condition) or the conditions that would normally be encountered during work of that nature in the particular area (Type II Differing Site Condition).

10.5.4 FAR Clause 52.242-14, Suspension of Work

The Suspension of Work clause allows the government to suspend, delay, or interrupt the contractor’s work for the period of time that is appropriate for the convenience of the government. If the contractor’s performance is suspended, delayed, or interrupted for an unreasonable period of time by the government, the contractor is entitled to an adjustment for any increase in the cost of performance. Under the Suspension of Work clause, the contractor is not entitled to profit.

10.5.5 FAR Clause 52.211-18, Variation in Estimated Quantity (VEQ)

The VEQ clause allows an adjustment to the contract when the actual quantities vary by more than 15 percent from the bid schedule quantities. Adjustments are allowable only if the contractor's costs increase or decrease due solely to the variation. The unit price adjustment must reflect only reduced performance costs realized due to economies of scale on overrun units or increased performance costs experienced due to loss of efficiency on underrun units. The clause does not provide a remedy for situations where the contractor lost money due to a low bid, or where the contractor gained a windfall profit due to a high bid. The VEQ clause cannot be used for price adjustments in situations where the increase or decrease in quantity was caused by a differing site condition, a bid quantity error, or a contract change.

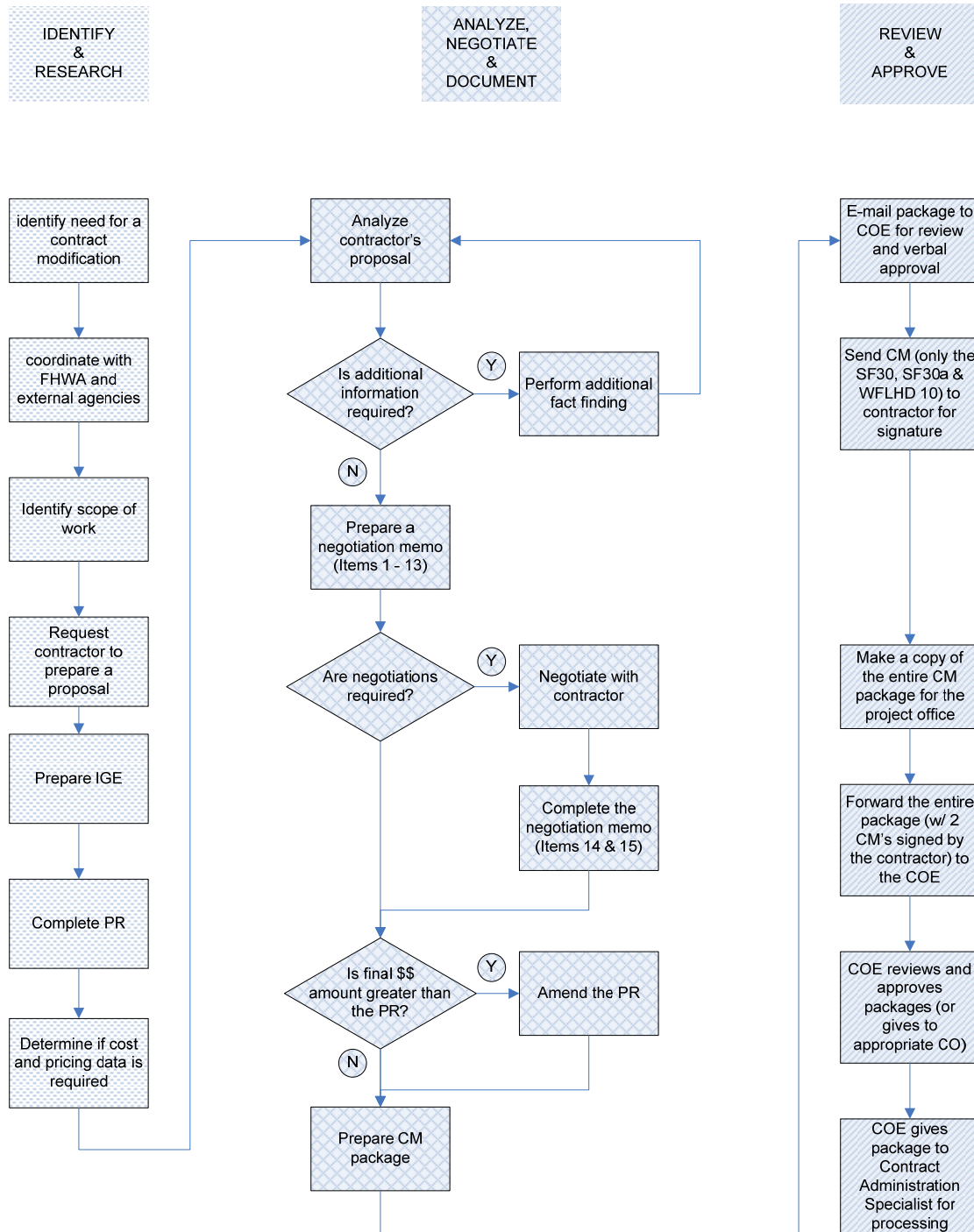
10.5.6 FAR Clause 52.248-3, Value Engineering (VE)

Contractors may be able to perform work in less expensive ways than provided in the contract. The Value Engineering clause is the appropriate avenue for addressing a contractor-initiated change. The clause is an incentive for the contractor to develop cost savings proposals, as it allows the contractor a share of the cost savings realized from the approved value engineering change proposal.

10.6 CONTRACT MODIFICATION PROCESS

The process shown below and outlined on the following pages provides the requirements for developing, preparing, and executing a contract modification. While the process applies to the majority of contract modifications, the steps may be reordered or modified depending on the situation.

The Project Engineer is responsible for completing the process and ensuring the COE is kept involved and informed throughout the process.



10.6.1 Identify the Need for a Contract Modification

Contract modifications are initiated for a multitude of reasons. In general, either the land-owning agency, a cooperating agency, the contractor, or FHWA can identify the need for a contract modification. Typical situations, which may necessitate a modification, are listed below.

- **Land-Owning Agency**
 - Provide an alternate materials source
 - Paving of campgrounds or parking areas
- **Road Maintaining or Owning Agency**
 - Stockpiling aggregate for owner's use
 - Change work restrictions listed in the contract
- **Resource or Regulatory Agency**
 - Change environmental restrictions listed in the contract
 - Revise culvert pipe details to improve fish passage
 - Revise revegetation plans
- **Contractor**
 - Correction of an error or omission in the plans or specifications
 - Price adjustment for acceptance of work or material which does not conform to the contract requirements
 - Value engineering proposals
 - Equitable adjustments for differing site conditions or variations in quantity
 - Time extensions for excusable delays
- **FHWA**
 - Change in the plans or specifications
 - Adjustments for suspensions or terminations for convenience
 - Correction of an error or omission in the plans or specifications
 - Adding work not provided for in the plans and specifications
 - Substituting or deleting work
 - Accelerating work
 - Changing method of measurement
 - Changing time (notice to proceed, winter shutdowns, fixed completion date)

10.6.2 Coordinate with FHWA and External Agencies

Once the need for a modification has been identified, it is essential for the Project Engineer to coordinate with the parties who may have an interest in the modification. Continue this coordination throughout development of modification. Coordination with appropriate parties will ensure the modification is developed properly and issued timely. Also, the earlier an interested party is brought into the process, the greater likelihood that the modification will be developed smoothly and successfully.

The parties which are most commonly involved in the contract modification process and their roles in the process are listed below. As this list is not all-inclusive, use judgment and discretion in selecting who will be involved for the particular situation.

Document the cross-functional team members' involvement and concurrence with the development of the contract modification. Include this documentation with the modification support data.

10.6.2.1 Land Owning and Road Owning or Maintaining agencies (U.S. Forest Service, County, State DOT, NPS, etc.)

The Project Engineer will need the agency's concurrence in context of all changes. Although some modifications may not affect the road owners, it is a good idea to keep them informed of all modifications. It allows them to be a partner in the project and results in a smoother running project. If the road owner requests the modification, this request should be provided in writing. Depending on the scope of the modification, the road owner may need to provide approval and funding. In general, the same guidelines exist for the landowners as for the road owners.

For National Park Service projects, you should prepare a letter to the appropriate officials, explaining the general scope of the change as well as the expected dollar range.

10.6.2.1 FHWA

- Financial Manager

This individual will establish the availability of funds for the proposed modification. If funds are not currently available, the Financial Manager will research other funding avenues. For modifications estimated to be greater than \$50,000 or modifications developed during the last quarter of the fiscal year, notify the Financial Manager of the approximate dollar amount prior to refining the scope of the modification. The availability of funds can severely impact both the scope and the timing of the modification.

- Project Manager (Project Development) and Designer

The Project Manager and Designer are your main points of contact for nearly all contract modifications. Communication with them is critical to identifying both the underlying reasons for particular design details or specifications, as well as commitments (to owning, maintaining, and resource agencies) that may be impacted by the modification. They can also assist in coordinating with other FHWA technical specialists.

- Environmental Engineer or Specialist

Contact the Environmental Engineer or Specialist if there is any possibility that the proposed modification might have environmental or permit consequences, or might alter the environmental mitigation features established in the contract. The Environmental Engineer or Specialist will coordinate any permit requirements.

- Materials Team

Coordinate proposed changes to materials specifications (gradation, sand equivalent, pavement structure, material sources, etc.) with the Materials Team.

- Bridge Team

Discuss proposed changes to structures (bridge, retaining wall, box culvert, etc.) with the Bridge Team.

- Hydraulics Team

Coordinate proposed modifications to culverts and major erosion control features with the Hydraulics Team.

- Geotechnical Team

Coordinate proposed modifications to slopes, retaining walls, pavement structure, material sources, etc., with the Geotechnical Team.

10.6.2.3 Cooperating Agencies

Cooperating agencies include: State Fish and Game, U.S. Fish and Wildlife, National Marine Fisheries Services, U.S. Army Corps of Engineers, U.S. Forest Service, State Department of Transportation, BLM, military, etc.

10.6.3 Identify Scope of Work

Identification of a clear and concise scope of work will enable the contractor to develop their price proposal and will provide a basis for negotiations. The scope of work needs to include sufficient detail for the contractor to reasonably develop their proposal. The scope of work may be revised based on information provided in negotiations or discussions with the contractor.

Include the following in the scope of work:

- General description of the proposed modification
- Location
- Preliminary specifications and design details
- Quantity of work
- Restrictions on when and how the work can be performed

10.6.4 Request Contractor to Prepare a Proposal

Once the scope of work has been identified, prepare a letter requesting the contractor to develop a price proposal for the proposed modification. Include the following in the letter:

- Proposed modification number (Note: To the extent possible, modifications should be numbered sequentially. If an earlier proposed contract modification is voided, do not use that number for your new modification)
- Scope of work
- Request to prepare a price proposal for the identified scope of work
- Preferred pricing format (square meter, lump sum, day, etc.)
- Time
- Date by which the price proposal should be submitted to the Project Engineer

A good request to the contractor would resemble this:

Dear "Contractor:"

As discussed with you on January 16, FHWA plans to have you pave the section of road between Stations 10+00 and 20+00. This added work will be covered in Contract Modification No. 006.

Please submit a price proposal based on the following information:

- *Place hot asphaltic concrete pavement between Stations 10+00 and 20+00*
- *3-inch depth, 24-foot width, see Plan Sheet A.2 for typical section*
- *Comply with Section 401 specifications*
- *Place the pavement in one lift*
- *Estimated quantity is 450 tons*
- *Work will be measured and paid by the ton*
- *Work will be paid under Item M02 40101, Hot Asphaltic Concrete Pavement*

The paving between Station 10+00 and Station 20+00 must be completed by September 14, 2007.

Please submit your price proposal to me by February 20, 2007.

10.6.5 Prepare an Independent Government Estimate (IGE)

10.6.5.1 Prepare an Independent Government Estimate (IGE)

IGEs are required for all priced contract modifications except modifications to exercise fixed priced options (FAR Part 17).

A well-prepared IGE is essential if the government is to receive a fair and reasonable price for the contract modification work. Without an accurate IGE, the government has no basis upon which to evaluate the contractor's proposal. Therefore, it is imperative to prepare the independent government estimate prior to receiving the contractor's proposal and to not base the IGE on data furnished by the contractor. The level of detail should be commensurate with the complexity and value of the modification.

Sign and date the IGE once it is completed. Also, label the top of the IGE "*For Official Use Only.*" Do not disclose the IGE prior to conducting negotiations with the contractor.

IGE's can be cost-based or price-based. Both methods are explained below.

10.6.5.2 Cost-Based IGEs

Step 1. Describe the general scope of the work, the location, and site characteristics.

Include this information in the Background section of the IGE.

A good understanding of what the work entails is critical to developing an accurate IGE. Think about what needs to be constructed, performed, or changed. What quantities are involved? Where will the work occur? What type of site conditions will be encountered? Include this information in the *Background* section of the IGE.

Example

This IGE calculates the cost to excavate 52,500 cubic yards of material and place it in fills. The additional excavation work will occur between Station 9+500 and 14+200. While the contractor has the right to place the material anywhere within the 10 mile project limits, most of the excavated material will be placed between Stations 9+000 and 14+800.

The material to be excavated consists of silty gravels. No rock excavation is expected and the geotech report indicates that all of the material will be suitable.

Step 2. Determine HOW the work will be performed – high level.

Include this information in the Background section of the IGE.

The purpose of this step is to engage the critical thinking needed for Step 3. Explain the concept and how the work will be performed logistically. List the required equipment, labor, and materials. Do this at a high level. The details will be added in Step 4. Include this information in the *Background* section of the IGE.

Example

Most of the cuts are near large embankments. Therefore, the equipment will be a blend of dozer push and off-road trucks. Material will be placed with another D6 dozer, rollers and water trucks. Most of the excavation for the change will be sliver cuts, which is drastically different than the 20401 work covered in the original bid item.

Step 3. Is the nature of the work similar to an existing contract item?

Step 2 identified how the contractor is likely to approach the work. If this approach is similar to an existing bid item or an item in a recent and competitively bid contract, you may be able to use the unit price for that item. Skip to the *Price-Based IGEs* section for more information on using bid item prices for the IGE. If the approach identified in Step 2 is not similar to an existing bid item or an item in a recent and competitively bid contract, it will be necessary to develop the IGE based on the cost of the work as outlined in Step 4 below.

Example

The 20401 quantity in the original contract consisted of major cuts and fills. This is drastically different than the 20401 work in the modification.

Step 4. Determine the method of measurement.

Include this information in the Background section of the IGE.

At some point in the IGE process, the method of measurement must be identified. The various methods of measurement are defined in Section 109 of the FP. When selecting a method, consider the accuracy as well practicality. For example, the most accurate way to measure borrow might be by the ton, but if no scales are available, it would be sensible to use truck measure (cubic yards) to establish the quantity rather than having the contractor mobilize scales.

Step 5. Determine what equipment will be used to perform the work and its cost.

Include this information in the Equipment Support Data section of the IGE.

First, identify the type and size of equipment that will be used to perform the work. Consider what is reasonable for the nature of the work, but also factor in what the contractor has available at the site. For example, if a D4 dozer would be able to perform the work, but the contractor's smallest dozer at the project is a D8, it may be more cost effective to use the D8 since it wouldn't require an additional mobilization. Identify the type of equipment (loader, front end), the brand name (Caterpillar), the model number (950G), and the year manufactured (2004).

Second, determine the cost. For contractor-owned equipment, the preferred method is to use the contractor's equipment rates, computed by a certified public accountant. However, these rates are often difficult to obtain and therefore the U.S. Army Corps of Engineer's Construction Equipment (USACE) Ownership and Operating Expense Schedule Equipment rates are most commonly used. For rented equipment, always use the actual rented rate, adjusted as explained below. Rates derived from other equipment manuals (Blue Book, etc.) should not be used.

U.S. Army Corps of Engineer's Equipment Rates

The U.S. Army Corps of Engineer's publishes equipment rates for twelve regions across the United States. Go to <http://www.nww.usace.army.mil/cost> to find the rates for the region in which the project is located.

There are two ways to derive rates from the U.S. Army Corps of Engineer's Construction Equipment (USACE) Ownership and Operating Expense Schedule Equipment Rates Manual – from predetermined rates or by calculating a rate. The USACE manual provides a flow chart (Figure 1-1) at the end of the first chapter to help users better understand the process for developing an hourly equipment rate. The flow chart shows the decision points that allow users to decide whether to use the predetermined rate tables, or calculate the rate using the method shown in Figure 2-1 or using CHECKRATE.

The hourly rates shown in Table 2-1 reflect catalog list prices of equipment manufactured in a specified year. For the July 2007 Region 8 manual, the equipment prices are based on a 2004 manufacture year. For WFLHD, if the equipment on your project is within 5 years of the date of the manual, you may use the predetermined rates. If the equipment is older, calculate the rate as shown below.

A. Predetermined Rate

Hourly rates for average conditions are shown in Table 2-1. The hourly rate is the sum of ownership and operating costs. The ownership portion of the rate consists of an allowance for depreciation (DEPR) and facilities capital cost of money (FCCM). Operating costs include allowances for: 1) fuel, 2) filters, oil, and grease (FOG), and 3) repairs (includes maintenance and major overhauls).

In Table 2-1, first locate the type of equipment (excavator, truck, etc.) and then find the brand, model, and size. Go over to the "column" to locate the hourly cost. Simply use the hourly cost from the "Total Hourly Rate" column in the IGE. Again, this is the ownership and operating cost (fuel, FOG, and repairs), so do not add those costs in again.

Example – Data from USACE Manual

T15CA023 D-6R	TRACTOR, CRAWLER (DOZER), 165 HP, LOW GROUND PRESSURE, POWERSHIFT, W/5.09 CY SEMI-U BLADE (ADD ATTACHMENTS)	165 HP D-off	\$305,269	81.66	16.55
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Example – IGE (Equipment Support Data)

Description	Year	Source	Adjustments			Rate
			Base Rental	Fuel Rate (gph)	FOG	
Dozer D6R, Caterpillar	2004	USACE, T15CA023				\$81.66

B. Calculated Rate

Information necessary for establishing the correct rate must be obtained to provide an accurate assessment.

Fill out the *Equipment Information Required for Corp Rate Analysis* worksheet¹

- Primary information required:
 - Year of Manufacture, Make, Model, Horsepower, Tire Data, Attachments and Purchase Price if available.

Download Corp Rate manual for your state at the US Army Corps of Engineers' (USACE) website at <http://www.nww.usace.army.mil/cost/>² and open the entire document in PDF format. Save a copy of the manual and the CHECKRATE Program to your hard drive, as you will need to be able to toggle between both open files several times. The applicable manual for your state is shown below:

- Montana and Wyoming - Region IV
- Washington, Oregon and Idaho - Region VIII.
- Alaska - Region IX

Open CHECKRATE program in Microsoft Excel and select the "Enable Macros" button when prompted.

Save file as a unique filename.

Update Area Factors in CHECKRATE

- At the bottom of the CHECKRATE Spreadsheet, open the "Area Factors" tab.
 - Update the information on this page based on the current factors in Appendix B from the Corp Rate Manual.
 - If the actual fuel prices are known and differ by more than +/-10%, input the actual fuel prices into the data.

In the Corp Rate Manual, locate the equipment you want to analyze in Table 2-1.

- Write down the ID NO., Category Code, and Subcategory Code as it will be used for other tables.

Enter equipment data under "Land Based" tab in the CHECKRATE Program

- Under Equipment Description Line #1, enter the equipment description.
- Under Equipment Description Line #2, enter Category Code, Subcategory Code, and ID No. corresponding to the equipment analyzed for future reference³.
- Determine Operating Condition – Average or Severe
 - Under Appendix C of the Corp Rate Manual, locate the Category Code and assess the correct operation condition.
- Enter the Discount Rate – Use 7.5% for all equipment except Highway Trucks which have a discount rate of 15%
- Do not adjust Freight Weight, as it will automatically update when the Shipping Weight is entered later.
- The next nine factors are located under Appendix D if the Corp Rate Manual⁴.
 - Locate the corresponding Category Code and Subcategory Code
 - **CAUTION:** Under Column C, make sure to use the row with "A" for Average Operating Condition and "S" for Severe Operating Condition.

¹ May require input from the Contractor to identify items such as purchase price, current fuel prices, etc.

² Full document files are large (5+ Mb); therefore download while in WFLHD if possible.

³ If the piece of equipment is does not match the available pieces in the Corp Rate Manual, find an equivalent piece of equipment based on horsepower, capacity, shipping weight, etc.

⁴ Note the key at the bottom of the page for easy reference to column heading identification.

- Enter the appropriate factors in the CHECKRATE program in the correct column for Average or Severe Operating Condition.
 - Write down the corresponding Economic Key (EK) value from this table, as it will be used for the Economic Factors in the next section.
- Enter the Economic Factors for Equipment and Tires from Appendix E.
 - This will adjust the equipment rate due to the age of equipment and tires.
 - Enter the factors, **NOT** the years.
- Enter the Tire Life values from Appendix F
 - Examples:
 - For all-wheel drive equipment (Front End Loaders, etc.), enter Tire Life value of all tires under Drive Tires.
 - For rear-wheel drive equipment (highway trucks, motor graders, backhoes, etc.), enter Front Tires Life values under Front Tires and Rear Tire Life values under Drive Tires.
 - For front-wheel drive equipment, enter Front Tire Life value for front tires under Drive Tires, and the Rear Tire Life Value under Trailing Tires.
 - For tracked equipment, do not enter values.
- Enter Equipment Details from Table 2-1.
 - Use List Price unless Actual Purchase Price is known.
 - **DO NOT** enter both values
 - Tire Costs:
 - For all-wheel drive equipment, enter sum of all tire costs under “Total Tire Cost Present Yr – Drive.”
 - For rear-wheel drive equipment, enter sum of front tire costs under “Total Tire Cost Present Yr – Front” and the sum of rear tire costs under “Total Tire Cost Present Yr – Drive.”
 - For front-wheel drive equipment, enter sum of front tire costs under “Total Tire Cost Present Yr – Drive”, and the sum of rear tire costs under “Total Tire Cost Present Yr – Trailing.”
 - For tracked equipment, do not enter values.
- Fog Extra
 - If the fuel prices have not required adjustment, leave Fog Extra as Zero.
 - If the fuel prices require adjustment, adjust the Fog value for the equipment from Table 2-2.
 - Multiply the same ratio used to adjust fuel by the value under the FOG column of Table 2-2 and subtract the calculated value from the original value and enter that amount under “Fog Extra”
- Fuel Type
 - Enter the appropriate Fuel Type Code in the left column.

Hourly Rate is given for both 40 hour work week, and other specified hours/week.

Standby Rate is also calculated for items such as Suspension Orders or other standby delays.

In the CHECKRATE Program, the “Land Based Detail” tab at the bottom will provide a printable version for each piece of equipment to provide to the Contractor and include with your support documentation.

Equipment Information Required for Corp Rate Analysis

1. Project Data:

Project Name & Number: _____

Contract Number: _____

2. Equipment Specification Data:

Equipment Description: _____

Model and Series/Capacity: _____

Year of Manufacture: _____

Horsepower – Equipment _____

Horsepower – Carrier⁵: _____

Fuel Type and Price – (Circle One)

Equipment: 0-None; 1-electric; 2-gasoline; 3-diesel off-road; 4-diesel on-road; 5-marine gas; 6-marine diesel

Equipment Fuel Price: _____

Carrier: 0-None; 1-electric; 2-gasoline; 3-diesel off-road; 4-diesel on-road; 5-marine gas; 6-marine diesel

Carrier Fuel Price: _____

3. Shipping Weight (cwt) _____

4. Tire Sizes and number of tires: Cost of tires based on present year

	Year Purchased	Size/Ply	No.	Unit Price	Cost
Front (FT)					
Drive (DT)					
Trailing (TT)					
Total Tire Cost:					

5. Overall List Price (At year of Manufacture) _____

or Actual Purchase Price _____

6. List of Attachments: _____

⁵ Examples of Carriers include truck-mounted drills, cranes and hydroseeding equipment. The truck is designated as the Carrier and the drill/crane/hydroseeder is the Equipment.

Rental Rates

If the equipment is rented, the corresponding rental rate should be used. When IGE equipment rates are based on rental rates, be sure to document how the rental rate was determined (i.e., phone call quote, faxed quote, etc.).

Rental companies usually lease equipment by the month or week. To determine the hourly rate for equipment rented on a monthly basis, divide the monthly rate by 176 hours. (*Reference: Contract Administration Core Curriculum Participant's Manual and Reference Guide 2005, Page 89.*) To determine the hourly rate for equipment rented on a weekly basis, divide the weekly rate by 40 hours.

Step 6. Determine the duration of the modification work.

Include this information in the Time Support section of the IGE.

The duration (working days) needs to be calculated to determine the overall cost of the modification. Duration is based on the quantity of work to be performed and the production rate. The production rate is based on the nature of the work, site conditions, equipment capability, and other factors. Production rates can be based on estimates for similar work under similar conditions (e.g., 150 cubic yards/hour) or can be calculated based on the detailed situation using project experience or references such as the Caterpillar Performance Handbook. Example 2 below shows how to calculate the duration for removing and disposing of slide material.

Example 1

Most of the work will be a blend of dozer push and off-road truck haul since most of the cuts are near larger embankments. Therefore a conservative production rate is 150 cy/hour.

Duration = 52,500 cy ÷ 150/hr = 350 hours = 35 days

Example 2

Worksheet for Calculating Haul Duration

Assumptions

Quantity	5250	ton	Note: Assumed 145 pcf for mud slide material as it has the consistency of concrete
Longest Haul Length	1	miles	
Shortest Haul Length	1	miles	
Hours per shift	10	hours/day	
Load and Dump rate	10	minutes each	Note: High load and dump rate due to NPS having to check each load for unexploded ordinance.
Avg. truck speed	30	mph	
Capacity of truck	14	ton	
No. of trucks	3	trucks	

Production Rates & Duration

Avg. 1- way haul dist =	1	miles						
Time for one way trip =	1	miles	/	30	mph	X 60 min/hr =	2.0	minutes
Cycle time	Load	10						
	Haul	2.0						
	Dump	10						
	Return	2.0						
	Total	24	min					
Loads per truck per day =	10	hours/day	X 60 min/hr	÷	24.0	min/load =	25.0	loads/trk day
						USE	25	loads/trk day
Daily production =	3	trucks X	14	tons/ trk X	25	lds/ trk day =	1050	tons/day
Duration =	5250	tons /	1050	tons/day =	5.0	days		
						USE	5.0	days

Step 7. Determine labor requirements and costs.

Include this information in the Labor Support Data section of the IGE.

Labor requirements are based on the nature of the work and the equipment used. There are two ways to calculate labor costs – using the Davis-Bacon rates in the contract or using the actual payroll rates. Either method is acceptable but the actual payroll rate might be higher than Davis-Bacon and therefore would yield a more accurate estimate of the contractor's cost.

Davis-Bacon

To determine the labor rate using the Davis Bacon, go to the *Minimum Wage Schedule* in the contract. First identify which classification the employee falls under (e.g., carpenter, power equipment operator, etc.). Then determine the appropriate group and zone (if applicable) for the project.

In addition to the employee's wages and fringe benefits, the contractor also incurs indirect costs such as: FICA, Medicare; state and federal unemployment taxes; workers compensation; general liability insurance premiums; paid vacation and sick leave; and health, dental and/or disability insurance premiums paid by the company. These costs are commonly referred to as payroll burden. Payroll burden rates vary from company to company, so request the rate from your contractor.

Note that when calculating the overtime rate, the sum of the base rate and zone are multiplied time 1.5, then the fringe benefits are added. Do not multiply the fringe benefits times 1.5.

Also, it's important to know whether the contractor pays fringe benefits in cash to the employee, or if the fringe benefits are placed in a bona fide benefit program. If they are paid in cash, payroll burden is applied to the fringe benefits. If they are paid into a program, payroll burden is not applied to the fringes benefits. Check the contractor's payroll to determine how they pay fringe benefits.

Example

!! Note - This example assumes the fringe benefits are paid in cash to the employee. Thus, payroll burden is applied to the base rate and fringe amount.

Labor Rate - Regular Time

Labor Description	Group	Base Rate	Zone	Fringe	Subtotal	28% Burden	Total Hourly Rate
Carpenter	-	\$28.41	-	\$11.16	\$39.57	\$11.08	\$50.65
Flagger	5	\$19.22	-	\$10.10	\$29.32	\$8.21	\$37.53
Laborer	3	\$23.03	-	\$10.10	\$33.13	\$9.28	\$42.41
Operator, Group 2	2	\$30.07	-	\$10.35	\$40.42	\$11.32	\$51.74
Operator, Group 3	3	\$29.21	-	\$10.35	\$39.56	\$11.08	\$50.64
Operator, Group 4	4	\$28.59	-	\$10.35	\$38.94	\$10.90	\$49.84
Truck Driver	3	\$24.65	-	\$10.00	\$34.65	\$9.70	\$44.35

total regular hourly rate = (base rate + zone + fringe) x (1 + % burden)

Labor Rate - Overtime

Labor Description	Group	Base Rate	Zone	OT Rate	Fringe	Subtotal	28% Burden	Total OT Hourly Rate
Carpenter	-	\$28.41	-	\$42.62	\$11.16	\$53.78	\$15.06	\$68.83
Flagger	5	\$19.22	-	\$28.83	\$10.10	\$38.93	\$10.90	\$49.83
Laborer	3	\$23.03	-	\$34.55	\$10.10	\$44.65	\$12.50	\$57.15
Operator, Group 2	2	\$30.07	-	\$45.11	\$10.35	\$55.46	\$15.53	\$70.98
Truck Driver	3	\$24.65	-	\$36.98	\$10.00	\$46.98	\$13.15	\$60.13

total overtime hourly rate = [(1.5 x (base rate + zone)) + fringe] x (1 + % burden)

Step 8. Determine specific material requirements, specifications, and costs.

Include this information in the Materials sections of the IGE.

To accurately identify the material costs, the requirements or specifications must be known. What is the aggregate gradation?, what class of concrete?, what type of geotextile?, what size of culvert?, etc. It is also important to know the shipping cost if applicable. Include state or local sales taxes as well.

The most accurate estimate of material costs is to call the supplier for a quote. If possible, get more than one quote – this ensures the price is reasonable, plus it will be useful information during negotiations.

Example

Material: 3/8" Grout

Specification: 235 lb/cy cement, 67 lb/cy fly ash, 1,598 lb/cy sand, 252 lb/cy water

Supplier: Ardstone of Columbia Falls is the only supplier within 100 miles

Price Quote: \$140/cy for material; an additional \$14/cy for delivery to Glacier National Park.

Total Price: \$154/cy

Step 9. Summary Section of the IGE

Transfer information such as the item quantity, production rate, duration, equipment rates, labor rate, and material costs to the Summary section. Fill in the hours and units to calculate the respective costs.

The Summary section shows the equipment, labor, and material costs. It also includes overhead, profit, and bond amounts, and shows the final unit price for the IGE.

The person who prepared the IGE should sign and date the Summary section.

Step 10. Add overhead.

Include this information in the Summary section of the IGE.

The contractor is entitled to overhead on all modification work, regardless of the operative FAR clause.

Overhead compensates a contractor for costs not included in their direct equipment, labor, or material rates. WFLHD contractor's overhead rates range from approximately 7% to 14%, but rates as high as 22% are not uncommon for small companies. A reasonable rate to use for the IGE is 10%, but use the contractor's audited rate if you have it.

Overhead is applied to all direct costs (e.g., equipment, labor, and materials).

Step 11. Add profit.

Include this information in the Summary section of the IGE.

The contractor is entitled to profit as defined by the particular FAR clause the work falls under. Profit is allowed on modifications under the Changes, Variation in Estimated Quantity, and Differing Site Condition clauses, but when determining compensation for work under the Suspension of Work clause, the contractor is not entitled to profit.

Profit is applied to all direct and indirect costs (e.g., equipment, labor, materials, and overhead).

The rate of profit should fairly reflect the nature of the work and the risks involved. If the modification work is more difficult than original contract work, a higher profit rate may be warranted. When the modification is priced after the costs have been incurred, a lower rate of profit may be appropriate. Profit rates between 5% and 15% are generally acceptable, depending on the nature of the work.

If the work is performed by a subcontractor, the subcontractor is entitled to overhead and profit, and the prime contractor is entitled to those markups as well. Prime contractor markup usually ranges between 5% and 15%. Some prime contractors request a combined markup for overhead and profit and some may show them separately.

The following example shows how to compute subcontractor overhead and profit, and prime contractor markup.

Example

Equipment, labor, and material subtotal		\$608,528
Subcontractor Overhead	10%	<u>\$60,853</u>
	subtotal =	\$669,380
Subcontractor Profit	7%	<u>\$46,857</u>
	subtotal =	\$716,237
Prime Contractor Markup	5%	<u>\$35,812</u>
		\$752,049
Bond	0.60%	<u>\$4,512</u>
	total =	\$756,561
	Item quantity (cubic yards)	52,500
	unit price (per cubic yard)	\$14.41

Step 12. Add bond cost.

Include this information in the Summary section of the IGE.

Just after a contract is awarded, the contractor must secure a performance bond. The purpose of this bond is to guarantee the project will be completed, either by the contractor or through its surety. At the end of the contract, if the final contract amount is higher than the award amount, the bond premium is adjusted upward. If the final amount of the contract is less than the award amount, the contractor receives a credit.

Each modification (whether they increase or decrease the contract amount) should include an amount for the bond premium. This is usually between 0.5% and 1.5% depending on the volume of work. To determine the actual percentage the contractor is paying, review the bond documentation submitted for the initial mobilization payment.

Apply the bond premium to the final price of the modification (e.g. direct and indirect costs, and profit).

Step 13. Determine effect on other contract work.

Include this information in the Time Support section of the IGE.

A more difficult part of the IGE is determining the modification's impact on other work. These are some questions to consider . . .

- Does the modification work disrupt the contractor's haul for another item?
- Does the modification work take resources away from other contract work?
- Does the modification work push other contract work into a later time period, thus affecting fuel or material prices, or causing additional remobilization costs?
- Does the modification work change how a contractor was going to approach other contract work?

If the answer is yes, the impact must be defined (i.e., what equipment and labor for how many hours) and the costs must be estimated as outlined in this section.

Step 14. Determine the modification's effect on the contract fixed completion date.

Include this information in the Time Support section of the IGE.

The IGE not only needs to estimate the contractor's price to perform work, but also how the contract fixed completion date is affected. The two main sources for analyzing time impact are common sense and the contractor's construction schedule.

Review the contractor's schedule and consider the following:

- Is the modification work on the critical path?
- Does the modification work affect when critical path work can be performed?
- Does the modification work take resources away from critical path work?
- If the modification adds time to the critical path, does it push the fixed completion date into a less (or more) favorable season?

10.6.5.3 Price-Based IGE's

In Step 3, you determined whether or not it was appropriate to consider using a bid item from an existing contract as your IGE price.

An existing bid item price (from the subject contract or another contract) may be used ONLY if the following conditions are met:

- the contract from which the bid price is obtained must be a competitively bid contract;
- the contract from which the bid price is obtained must have been awarded within the last 12 months; and
- two or more contractors must have provided bids. The engineer's estimate does not count as a bid.

While it is also best if the nature and quantity of the work is similar, adjustments may be made to reflect any disparities

If the conditions in the above bullets are met, develop the IGE using one of the options below.

Preferred Option - Use Bid Tabs from Current Contract

- a. Review the bid tabs from your awarded contract.
- b. Compare your contractor's price to the other bidders' prices (for the particular item)
- c. Look at the other bidders' prices. If there are any outliers – high or low, eliminate them from consideration. Average the other prices.
- d. If your contractor's price is comparable, say within 10 or 15 percent of the average of the other bidders, use your contractor's price for your IGE, then make adjustments as shown below.
- e. If your contractor's price is not comparable, use the average price that you developed in "c" above, then make adjustments as shown below. It is important to note that while the average bid price developed in "c" is your IGE price, it is not necessarily your negotiation objective. When the contractor's bid price is lower than the average price (as determined in "c"), your initial negotiation objective should be the contractor's price. If the contractor can justify why

their price for the modification work should be higher than their original bid price, it is acceptable to negotiate a price between the original bid price and your IGE.

Less Preferred Option – Use Bid Tabs from Other Contracts (Bid History Browser)

This method is less preferred because it introduces so many variables – is the project in the same area/state?, is the work really of a similar nature?, were the contractors faced with the same risk?, etc. If you are confident the bid items from other contracts are similar, use the bid history browser as a price data source. Find three or more contracts with the most similarity to the current contract (quantity, location, site conditions, etc.). Be sure the requirements listed in the bullets above are met (competitively bid contracts; awarded within last 12 months; two or more bidders). Review the prices and throw out any outliers. Average the remaining prices, then make adjustments as shown below.

Least Preferred Option – Use Price Agreed to in a Previous Modification

Sometimes the items in a modification will be similar to items in a previously executed modification. It is acceptable to use unit prices from the previously executed modification ONLY if:

- Unit prices in the previous modification were estimated as provided in this manual
- The quantity is similar
- The situation / nature of work is similar
- The price from the previous modification is truly fair and reasonable for the new modification.

When using prices from the existing contract or another contract, always consider the following adjustments:

- Location
- Haul distance
- Different materials
- More or less quantity
- Difference in how work will be performed
- Inflation
- Fuel prices

Include the following information in the price-based IGE:

- Description of work (Step 1)
- How the work will be performed (Step 2)
- Justification for using bid prices (Step 3)
- Method of measurement (Step 4)
- Determine the duration (Step 6)
- Summarize (Step 9)
- Determine effect on other contract work (Step 13)
- Determine effect on contract fixed completion date (Step 14)

10.6.6 Complete a Procurement Request

Contract modifications either increase, decrease, or have no effect on the contract amount. Procurement requests are required for modifications, which increase or decrease the contract amount. Procurement requests are not required for “no cost” situations (e.g. the contractor can begin work in a restricted area early and therefore the contract fixed completion is modified, or \$100,000 of work is added and \$100,000 of work is deleted from the contract).

Use the IGE as the starting point for establishing the PR dollar amount. The PR **must** be approved before any modification work begins and before you commence negotiations with the contractor.

Include the information listed below on the Procurement Request.

Block	Data
1	Project Engineer's Name
2C	Contract Number
4	Project Number and Name
5A (1)	Name, title, and signature of requisitioner
5C (1)	Date
6	Project Engineer's Name Project Office Address
9	CONTRACT MODIFICATION number, Item Number and Name, Quantity, Unit, Unit Price, etc. (Note: The list of items is necessary in order for Programming and Finance to accurately track the cost on the estimate to ensure that sufficient funds have been set aside to cover the full cost of the contract modification.)
10	Account Number The easiest place to locate the DELPHI project and task number for your project, is to go to the last page of your progress estimate. Note that the task number will always start with 540.00. When you send your PR to finance, this is automatically redirected to the Project's Program Coordinator. The Program Coordinator may change the account number based on availability of funds.

Funds for the proposed modification can originate from two places –

- Within the Contract

These are project funds that will not be used due to quantity underruns or unused incentives. In the quantity underrun case, the contract modification must delete the unnecessary items and quantities in order to make those funds available for the added work in the modification. If funds for the added work will come from unused incentives, specify which item(s) the funds are coming from (i.e., Item 40101, Item 30101, etc.). Before using incentive money as a source of funds for the modification, be absolutely sure that the incentive money is definitely unneeded. Even though funds for a modification are provided by ‘within the contract’ sources, the Financial Manager needs to approve the Procurement Request. This will facilitate proper tracking of funds.

- Outside the Contract

These funds come from the respective Federal Lands Highway Program (Forest Highway, Park Road and Parkways, etc.)

10.6.7 Determine If Cost and Pricing Data Are Required

Cost or pricing data may be required in the event the modification exceeds \$650,000 aggregate (i.e., consider both increases and decreases when determining the price adjustment). This requirement does not apply when unrelated and separately priced changes for which cost or pricing data would not otherwise be required are included for administrative convenience in the same modification. If the IGE is greater than \$650,000 (aggregate), the COE or the Contract Administration Engineer should review the FAR and advise you on the cost or pricing data requirements for your particular situation. If the IGE is greater than \$650,000 and it is determined that Cost or Pricing Data is not required, document the exception used and the basis for using it. Include this information in the negotiation memorandum (see 10.6.11).

For modifications less than \$650,000 (add the amount of increase to the amount of decrease to determine whether the threshold is met), you should not request the contractor to provide cost or pricing data.

10.6.8 Analyze the Contractor's Proposal

When you compare the contractor's proposal to the IGE, you are trying to determine: 1) if the contractor and you have the same understanding of the scope of work, 2) if their overall price is comparable to yours, 3) what elements of the proposal you agree and differ on, and 4) what the fair and reasonable price actually is.

10.6.8.1 Techniques for Analyzing the Contractor's Proposal

There are three techniques for analyzing a contractor's proposal; they are: price analysis, cost analysis, and profit analysis.

Price Analysis

Price analysis is the process of examining and evaluating a proposed price without evaluating its separate cost elements or proposed profit.

Various price analysis methods may be used to ensure a fair and reasonable price, given the circumstances surrounding the modification. Examples of such methods include, but are not limited to the following:

- Comparing proposed prices with independent government price estimates.
- Comparing contract unit prices with proposed prices for the same or similar items.
- Comparing proposed prices with historical bid data for similar items.

Cost Analysis

Cost analysis is the review and evaluation of the separate cost elements and profit in a contractor's proposal, and the application of judgment to determine how well the proposed costs represent what the cost of the modification should be. When performing cost analysis, your goal is to determine if the costs are *reasonable* (i.e. are the estimated hours accurate for the type work; are the equipment costs based

on audited rates or the Corps rates, etc.), *allocable* (are the charged costs associated with the item – for example, is the contractor charging excavation costs to an unrelated culvert change), and *allowable* (FAR Part 31 contains a list of specific cost items which are unallowable on government contracts. Examples include bad debts, contributions and donations, entertainments, and losses on other contracts.).

Various cost analysis techniques and procedures may be used to ensure a fair and reasonable price, given the circumstance surrounding the modification. Examples of such techniques include, but are not limited to the following:

- Comparing the individual cost elements of the contractor's proposal to:
 - actual costs previously incurred by the same contractor
 - independent government cost estimates
 - various cost schedules (Corps equipment rates, Means, etc.)
- Verifying cost or pricing data and evaluating cost elements, including:
 - the necessity for, and reasonableness of, proposed costs, including allowances for contingencies
 - the application of audited or negotiated indirect cost rates and labor rates

Profit Analysis

Both the government and contractors should be concerned with profit as a motivator of efficient and effective modification performance. Negotiations aimed merely at reducing prices by reducing profit, without proper recognition of the function of profit, are not in the government's best interest. Negotiation of extremely low profits, use of historical averages, or automatic application of predetermined percentages to total estimated costs do not provide proper motivation for optimum modification performance.

If cost or pricing data is required, use the 'structured approach' to determine the amount of profit.

When cost or pricing data is not required, determine the amount of profit as follows. If a change or modification calls for essentially the same type and mix of work as the basic contract and is of relatively small dollar value compared to the total contract value, the government may use the basic contract's profit rate as the pre-negotiation objective for the modification. For post-priced modifications, the contractor's risk has been eliminated. This factor should be considered when determining the profit rate for post-priced modifications.

10.6.8.2 Using the Techniques to Analyze the Proposal

When Cost or Pricing Data is not required, applicability of the techniques mentioned above will depend on what level of analysis you are conducting.

Since your first request to the contractor was for a 'price' proposal (i.e., no cost breakdown), the initial analysis technique should be price analysis. Compare the contractor's bottom line price to the IGE price. If the contractor's price is comparable to the IGE price, it is not necessary to obtain additional information from the contractor or to conduct further analysis.

If the contractor's price is not within an acceptable range of the IGE, you should consider requesting a cost breakdown of the contractor's proposal (see 10.6.10). Using their cost breakdown, you then can perform cost analysis to determine where the difference originates and which elements of the proposal you need to discuss with the contractor. For example, you and the contractor may agree on the type of equipment needed for the work, but may differ significantly on the cost per hour or the number of hours required to perform the work. The purpose of the cost analysis is to identify the elements that you are going to negotiate with the contractor. In addition, you will develop your negotiation objective based on what you have gleaned from analyzing the contractor's cost proposal.

When the contractor's proposed price is significantly lower than the IGE, you need to ensure you and the contractor completely understand the scope of work. Do not automatically agree to a price that is significantly lower than the IGE, thinking it's a good deal for the Government. On the other hand, if you and the contractor clearly agree on what is involved with performing the work, don't feel obligated to negotiate them upward.

When Cost or Pricing Data is required, you will need to analyze the contractor's proposal using cost, price, and profit analysis.

10.6.9 Accept the Contractor's Proposal or Perform Additional Fact Finding

If the contractor's price proposal is determined fair and reasonable or if you have enough information to formulate your negotiation objective, proceed to 10.6.13.

If your prices differ appreciably from the contractor's and you cannot accept their price as is, you should request more information from the contractor. Ask them to provide you with a cost breakdown of the work. This breakdown should include: equipment types, rates, and hours; labor rates and hours; material costs; and overhead and profit.

A good request for additional information would resemble this:

Dear "Contractor:"

I have received and reviewed your February 20 price proposal for CM 002. Your price for the new 40101 work is significantly higher than the government's estimate. In order for me to evaluate the reasonableness of your price, I request that you provide a cost breakdown for the work identified in my February 1 letter. In this breakdown, please include: equipment types, hours, and rates for the various operations; labor rates and hours; material costs (including any quote from subs or suppliers); and overhead and profit.

To expedite resolution of this modification, I would appreciate if you could provide the cost breakdown to me by March 3.

10.6.10 Prepare a Negotiation Memorandum

The negotiation memorandum is required for all proposed modifications. The prenegotiation elements required by FAR 15.406-1 and TAM 1215.406-170, and the negotiation documentation required by FAR 15.406-3 and TAM 1215.406-370 are addressed in the negotiation memo.

10.6.10.1 Purpose

The three main purposes of the negotiation memorandum are to: 1) establish the government's negotiation position; 2) obtain the contracting officer's approval of the negotiation objectives (if necessary) or the proposed final price; and 3) justify fair and reasonable pricing. A price is fair and reasonable if it is acceptable to the buyer, reasonable to the seller, and it is comparable to fair market value as established by the competitive marketplace. Project Engineers are not authorized to accept the contractor's price or negotiate with the contractor until the appropriate Contracting Officer has approved the proposed price or negotiation objective.

10.6.10.2 Format

Use the WFLHD memorandum form to prepare the negotiation memorandum.

10.6.10.3 Content

<p>Items 1 -13, 15, and 16 are required for <u>all</u> memos, regardless of whether negotiations are conducted. Item 14 is required when negotiations are conducted.</p>			
PRENEGOTIATION ELEMENTS	1	Subject	<p><i>"Prenegotiation and Price Negotiation Memorandum"</i> Note: use this title and only this title, regardless of whether you negotiate. "Project name and number" "Contract number" "Proposed contract modification number"</p>
	2	Date	
	3	From	"Project Engineer's Name"
	4	To	"Approving CO's name, <i>Contracting Officer</i> " See Figure 10.6-2
	5	Through (if necessary)	"COE's (and CE's) name"
	6	Description of Modification	Brief summary of <u>what</u> the modification entails
	7	Background	What brought about the modification and how did the modification evolve (from inception through the point when you requested a proposal from the contractor).
	8	IGE amount (price and time)	List each item shown in the IGE and show the sum of all the IGE items. Also show the number of days estimated in the IGE. Reference the IGE by date.
	9	Contractor's Proposed Price and Time	Summarize the contractor's proposal.
	10	Proposed Total Price (or Negotiation Objective)	<p>If you intend to negotiate, title this section "Negotiation Objective." If negotiations are not required, title this section "Proposed Total Price".</p> <p>In either case, identify the desired price (for each item) and time outcome. List items individually and show the total.</p>
	11	Justification	<p>Explain why the desired outcome is fair and reasonable. You determined your original fair and reasonable price by doing the IGE. Now you need to justify why the <u>revised</u> price is fair and reasonable.</p> <p>The justification needs to have substance, rationale, and detail sufficient to explain to a third party <u>how the overall reasonableness of the proposed prices were determined</u> and <u>how the objective represents a fair and reasonable amount</u>.</p> <p><i>This is a very important part of the negotiation memorandum!</i></p>
	<p>STOP! At this point, e-mail the negotiation memo, with Items 1 through 11 completed, to your COE for their review and verbal approval. If a higher level CO review is required, the COE will coordinate it. Your COE will review the memo and discuss necessary revisions with you. The COE (or appropriate CO) must approve your price or prenegotiation objective before you proceed any further.</p>		
	12	CO's approval	<p>In the negotiation memo, include a statement saying that you discussed the proposed price with the CO and that they approved the price/time on x date. Include a line for the CO to initial the statement. (The CO will sign this part when they receive the full package containing the modification signed by the contractor.)</p> <p>If negotiations are required, the CO may give you a dollar range for negotiations. For example, if the contractor's proposal is \$10,000 and your negotiation objective is \$6,000, the CO may set your negotiation limit at \$7,000 to allow for consideration of new information, etc. during negotiations.</p>
13	For modifications exceeding \$650,000 aggregate value	<p>If the contract modification will exceed \$650,000 and Cost or Pricing Data was not required, explain the exception used and the basis for using it (see 10.6.8). If Cost or Pricing Data was required for the modification, contact your COE to determine what additional documentation is required for the negotiation memorandum.</p>	

<p>STOP! If you can <u>accept the contractor's price without negotiations</u>, complete Items 15 and 16 below and proceed to 10.6.14.</p> <p>If you are <u>going to negotiate</u>, proceed to 10.6.12. Complete Item 14 after each negotiation session and Items 15 and 16 when negotiations are complete.</p>			
PRICE NEGOTIATION ELEMENTS	14	Negotiation Details	<p>Complete this section of the memo as each negotiation session is planned and performed.</p> <p>Include a brief description of the purpose of the negotiation and the date. List the name, position, and organization of each person representing the contractor and the government.</p> <p>If your negotiation objective increased beyond what was approved earlier, include a statement that you discussed the increase with the appropriate CO (include the date). Include a line for the CO to initial the change. Also include what was discussed during negotiations, what were the differences that you addressed, what were the agreements and concessions, what were the final prices, how did you arrive at the final prices, and will contract time be extended.</p> <p>You also need to describe why the final price is fair and reasonable. This section is very important. It should document the details of all of your discussions/negotiations regarding the modification. For simple modifications, it may span a short time period, but for complicated ones, it may document months of negotiations.</p>
	15	Unresolved Issues	<p>List any unresolved issues and explain any plans to resolve them. Also, if anything will be excluded from the modification release language, explain that in this section as well.</p>
	16	CO's approval	<p>The CO needs to approve the final price, whether or not negotiations were held.</p> <p>If negotiations were <u>not</u> held, include the following statements:</p> <p style="padding-left: 40px;"><i>The total price of this modification is \$ _____. Documentation of fair and reasonable pricing is provided above in "Justification."</i></p> <p style="padding-left: 40px;"><i>This modification does not change the contract fixed completion date.</i> <i>[or] This modification changes the contract fixed completion date to _____.</i></p> <p style="padding-left: 40px;">** Concurrence: _____, Contracting Officer</p> <p style="padding-left: 40px;">Approved: _____, Contracting Officer Date: _____</p> <p>If negotiations were held, including the following statements</p> <p style="padding-left: 40px;"><i>The total price of this modification is \$ _____.</i></p> <p style="padding-left: 40px;"><i>This modification does not change the contract fixed completion date.</i> <i>[or] This modification changes the contract fixed completion date to _____.</i></p> <p style="padding-left: 40px;">** Concurrence: _____, Contracting Officer</p> <p style="padding-left: 40px;">Approved: _____, Contracting Officer." Date: _____</p> <p style="padding-left: 40px;">** Note: Only include the concurrence statement when the approving CO is not the COE.</p>

Amount of Modification	Who must concur or review	Who can approve?
up to \$50,000 and or 50 days	-	COE
\$50,001 to \$200,000 and or 100 days	COE	CE
\$200,001 to \$500,000 and or > 100 days	COE and CE	Contract Development Engineer
> \$500,000	<ol style="list-style-type: none"> 1. COE and CE 2. Legal Review 3. Contract Development Engineer 4. Another Level III CO 	Contract Development Engineer

Note: The various levels of concurrence and approvals listed above are based on the net amount of the modification. The aggregate amount of the modification is used only to determine if cost or pricing data is required.

Figure 10.6-2
Contract Modification Concurrence and Approval Authority

10.6.11 Negotiate with the Contractor

The goal of negotiations is to reach agreement on a fair and reasonable price. A fair and reasonable price does not require that agreement be reached on every element of cost, nor is it mandatory the agreed price be within the government's initial negotiation position. Successful negotiations depend on good faith and fair dealing, and an understanding of both parties' interests.

10.6.11.1 The government's negotiator

In most cases, the Project Engineer is the government's negotiator. The Project Engineer is approved to negotiate within the dollar range approved by the CO in the negotiation memorandum.

For projects managed by contracted Construction Managers

The Project Manager will most likely lead negotiations. The Project Manager is approved to negotiate within the dollar range approved by the CO in the negotiation memorandum. Since the Construction Manager is closest to the project, and has analyzed the prices and work related to the modification, the Project Manager will rely heavily on the Construction Manager to provide input during negotiations.

10.6.11.2 Agenda for negotiations

The agenda can play an important part in negotiations and should be planned by the Project Engineer. Some negotiators will initially discuss non-controversial elements at the negotiations in order to create a climate of cooperation; others prefer to start by bringing up an issue where the government has strength to create positive momentum. In any case, all elements of the contract modification must be clear to both parties, including the work involved, any unusual features or technicalities, time required for work, and impacts on other work.

10.6.11.3 Dealing with new information

During negotiations, a new concept or additional information, which alters the basics of the pre-negotiation objectives, could be brought forth. Review the new information and if additional time for study is required, advise the contractor and reschedule the negotiations as appropriate.

If the contractor presents information that supports a higher price than what was approved in the negotiation memo, do not agree to it until the appropriate CO has approved the higher level.

10.6.11.4 Negotiation minutes

The Project Engineer should document each negotiation session with minutes of the negotiations. These minutes will be used to complete the negotiation memorandum.

10.6.12 Complete the Negotiation Memorandum

Complete the negotiation memo (Items 14 and 15) as provided in 10.6.10.

10.6.13 Amend the PR

If the final negotiated amount is greater than the “total estimated cost” shown on the procurement request, provide the Financial Manager with the revised amount. The Financial Manager will send a copy of the amended PR to you.

10.6.14 Determine What Type of Contract Modification to Issue

10.6.14.1 Bilateral Contract Modification

If the contractor and the government have reached full agreement on the work, price, and time considerations included in the modification, issue a bilateral modification and include the release language (SF 30, Block14) shown in Section 10.7.

10.6.14.2 Bilateral Contract Modification with Exceptions

When only a portion of a modification can be agreed upon, prepare a bilateral modification, which identifies the agreed upon elements, as well as the elements where no agreement was reached. For instance, if the contract modification increases the borrow excavation, equipment rental, and traffic control quantities, and the contractor agrees with prices for the borrow excavation and equipment rental, but not the traffic control items, the modification (SF-30a) should state:

In consideration of the equitable adjustments paid pursuant to this contract modification, the Contractor hereby releases the Government from any and all liability under this contract due to any facts or circumstances arising out of this contract modification, except for direct and indirect costs for the following:

*Temporary Concrete Barrier
Type A Warning Light*

The Contractor reserves the right to pursue further administrative action on Temporary Concrete Barrier and Type A Warning Light as established within this supplemental agreement under FAR Clause 52.233-1, Disputes.

In the “exception,” specifically state whether the exceptions apply to direct costs only, indirect costs (indirect costs overhead, profit, impact, delay, etc.) only, or to both direct and indirect costs. Clear and concise wording is essential when writing exceptions to the release language.

10.6.14.3 Unilateral Contract Modification

If FHWA and the contractor cannot reach agreement, the CO should issue a unilateral contract modification. Exhaust all possibilities for getting a bilateral modification (or bilateral with exceptions) before issuing a unilateral contract modification.

Unilateral modifications are also used to issue change orders (see 10.4.3).

10.6.15 Prepare the Contract Modification

10.6.15.1 Contract Modification

The contract modification consists of the following:

- SF-30 (see 10.7.1)
- SF-30a (see Section 10.7.2)
- Plans, details, specifications, drawings or other data required to clearly state the nature and scope work required by the modification
- WFLHD 10 (see Section 10.7.3)

10.6.15.2 Support Documentation

Include the following documents, in the order shown below, with the support package :

- Negotiation Memorandum
- Procurement Request (amended if applicable)
- IGE
- Contractor’s price proposal
- Documentation of cross-functional team involvement and concurrence
- Correspondence - Include copies of pertinent correspondence. **DO NOT** include original correspondence with the modification.
 - Contractor
 - FHWA (memos, e-mails, client and contractor correspondence)
 - Miscellaneous (client, resource agency, etc.)
- Records of any relevant discussions or field reviews
- Certification for cost or pricing data (if required)
- Concurrence from client agencies if needed, including commitments of any funding they may provide
- Complete the Contract Modification Database Report - The Contract Modification Database Report is used to measure the amount of and reasons for contract growth. The Database Report is also used to track modification timeliness. Complete the report and include it with the contract modification package.

10.6.16 E-mail the Contract Modification to the COE for Review

E-mail a copy of the modification to the COE for their review. For modifications greater than \$500,000, the COE will provide a copy of the contract modification to Legal Counsel for review.

10.6.17 Send the Contract Modification to the Contractor for Signature

Once you have the COE's verbal approval, send the contract modification to the contractor.

For bilateral modifications, send three copies of the contract modification (SF-30, SF-30a, WFLHD 10, plans, specifications, drawings, and other data which identifies the scope of work) to the contractor. One copy is for their use and the other two copies should be signed and returned to you for the CO's approval. Do not send any support documentation to the contractor.

For unilateral modifications, make one copy of the entire package for yourself and proceed to 10.6.20. Do not send anything to the contractor.

10.6.18 Copy Contract Modification Package for the Project Office

Once the contractor has signed and returned the contract modification (bilateral modifications only), make one copy of the entire package (Sections 10.6.15.1 and 10.6.15.2) for the project office. Be sure to place the support documentation in the order specified in Section 10.6.15.2.

10.6.19 Send Contract Modification (w/ all support documentation) to the COE

Forward the entire package (2 originals of Section 10.6.15.1 and 1 set of Section 10.6.15.2) to the COE. It is imperative that you provide the entire package to the COE immediately after the contractor has signed the modification (for bilateral modifications). Until the appropriate CO signs the modification, it is not an executed agreement, and the contractor has the right to withdraw their offer.

10.6.20 Review, Approve, and Distribute Contract Modification

The COE is responsible for ensuring that the appropriate level CO approves the modification within a timely manner.

Once the appropriate CO has signed the modification, the COE forwards the modification to the Contract Administration Specialist for copying and distribution to the Project Engineer and others. One original modification, with all support documentation is sent to the central files, and the other original (modification only) is sent to the contractor. The Contract Administration Specialist also enters the contract modification data into the Construction Status Database.

10.7 INSTRUCTIONS FOR SF-30 AND CONTINUATION SHEETS

10.7.1 SF 30, Amendment of Solicitation/Modification of Contract

Block	Title	Instructions
1	Contract ID Code	Leave blank.
	Page of Pages	Include only pages to be sent to the contractor.
2	Amendment/ Modification Number	Enter the three-digit consecutive number assigned to each bilateral or unilateral contract modification (e.g., "Contract Modification No. 004").
3	Effective Date	Enter "See block 16C."
4	Requisition/Purchase Req. No.	Leave blank.
5	Project No.	Enter the Project Number and Name, such as MT PFH 73-1(6) Pioneer Mts Scenic Byway
6	Issued by	Enter "Western Federal Lands Highway Division" and the Vancouver address.
7	Administered by	Leave blank.
8	Name and address of contractor	Enter contractor name and address as shown on the contract.
9	Amendment of solicitation no. and date	Leave blank.
10A	Modification of Contract/Order No.	Enter the DOT contract number, such as DTFH70-08-C-00001. This is on the award letter and the executed contract.
10B	Dated	Enter the contract award date.
11		Not applicable. Leave blank.
12	Accounting and appropriation data	Use the account number shown on the <u>approved Procurement Request</u> (PR) which may be changed by finance, such as . . . 1517535901201 540.00.F190.53 1753000000 25255 An incorrect account number in your Contract Modification requires an administrative corrective action, which ranges from the original signee correcting and initialing the mistake, to writing a new Contract Modification to correct the mistake.
13A		Mark this block for Change Orders (FAR Clause 52.243-4).
13B		Mark this block for administrative changes.

Block	Title	Instructions
13C		Mark this block for bilateral modifications. Cite the appropriate contract clauses by number and name (e.g., FAR Clause 52.236-2, Differing Site Conditions; FAR Clause 52.243-4, Changes; FAR Clause 52.242-14, Suspension of Work, etc.)
13D		Mark this block for unilateral modifications performed under any clause <u>other than</u> the Changes clause (e.g., FAR Clause 52.236-2, Differing Site Conditions; FAR Clause 52.242-14, Suspension of Work, etc.). Cite the appropriate clause by number and name.
13e		For bilateral modifications, mark the, “ <i>is required to sign this document and return <u>2</u> copies to the issuing office</i> ” block. For unilateral modifications, mark the, “ <i>is not required to sign this document</i> ”. Send unilateral modifications via certified mail.
14 Note: This information is usually entered at the top of the SF30a. The release language and “see Page 2 for continuation” is usually the only things that should be in Block 14.	Description of amendment/ modification	<p>Give a <u>concise</u> general description of the modification. Do not include all the details of the modification in this description, as those details will be provided in the text (SCR changes and Plan changes) of the modification.</p> <p>Indicate the modification’s effect on contract time. If time is not affected, state: “<i>The contract fixed completion date is not revised by this modification.</i>” If time is affected, state: <i>The fixed completion date in FAR Clause 52-211.-10, Commencement, Prosecution, and Completion of Work, Alternate 1, (April 1984) is changed from “October 15, 2008” to “November 26, 2008.”</i></p> <p>Also, state the reason for the modification. This should be a very concise, one to three sentence summary of what issue(s) the modification seeks to address. For example . . .</p> <ul style="list-style-type: none"> ○ If the contract modification reduces the 40101 quantity by 10,000 tonnes because the client agency has requested us to eliminate that section of paving, the contract modification would state: “This contract modification covers all charges associated with the elimination of paving from Station X+XXX to Station X+XXX.” ○ If the amount of rock to be encountered on the site is more than the contract indicates and the contractor is alleging a differing site condition, the contract modification may state: “This contract modification covers all changes associated with the increase in rock quantities at stations xxx to xxy.” or, “This contract modification covers all costs associated with the alleged differing site condition at stations xxx to xxy.” ○ If the Government makes a change in the contract plans, calling for more MSE walls, the contract modification may state: “This contract modification covers all quantity increases for Item zzzzz due to conditions at stations xxx to xxy.” ○ If the modification is necessary because the Plans or SCR’s were in error, do not state the reason for the modification. The description, such as “This modification adds fence at Station X+XXX to Station X+XXX” is sufficient. <p>Include the following release language: “<i>In consideration of the modification agreed to herein as complete equitable adjustments for the changes detailed herein, the contractor hereby releases the government from any and all liability under this contract attributable to the facts or circumstances giving rise to, arising, from, or relating to, this modification.</i>”</p>

Block	Title	Instructions
15A	Name and title of signer	This block is usually filled in by the contractor OR can be completed prior to sending to Contractor.
15B	Contractor/ Offeror	The person named in Block 15A, the authorized representative of the contractor, signs in this block to indicate agreement to a bilateral contract modification.
15C	Date signed	The person signing in Block 15B enters the date signed.
16A	Name and title of contracting officer	Enter the appropriate CO's name and "Contracting Officer". Do not use the Construction Operations Engineer, Construction Engineer, etc. titles
16B	United States of America by	The person named in Block 16A will sign here and provide their warrant number.
16C	Date signed	The signing CO will enter the date.

10.7.2 SF30a, Continuation Sheet

The SF30a is used to continue the description of the modification (Block 14) and to present any changes to the plans or specifications. The information shown for Block 14 in Section 10.7.1 is typically shown on the SF30a.

When adding or modifying specifications, use the format presented in the FP. Place the specification revision under the appropriate section number and name, heading (e.g., Description, Material, Construction Requirements, Measurement, or Payment) and subsection title (i.e., 601.03 Concrete Composition, 601-5 Placing Concrete, etc.). For instance, if you were modifying the first paragraph of 601.04, your specification would appear as follows:

<p>Section 601. – MINOR CONCRETE STRUCTURES</p> <p>Construction Requirements</p> <p>601.04 General. <u>Delete the first paragraph and substitute the following:</u></p> <p>Perform excavation and backfill work under Section 208. When concrete is cracked, spalling, or scaling, remove concrete to the nearest joint.</p>

Use the following instructions when modifying the specifications:

Add the following:

Amend as follows:

Add the following before the first paragraph:

(Added Subsection.)

Delete the first paragraph and substitute the following:

Also, write specifications in the imperative mood. For example, if you want the contractor to furnish and deliver permanent signs, your SCR would read:

633.01 *Add the following:*

This work also includes furnishing and delivering signs.

If you want the contractor to use 1-inch SCH 40 rigid PVC electrical conduit for speaker conduit, and you needed to put this into a new subsection, your SCR would read:

721.03 Speaker Conduit. *(Added Subsection.)*

Furnish 1-inch SCH 40 rigid PVC electrical conduit.

10.7.3 WFLHD 10, Continuation Sheet

WFLHD 10 is used to summarize the contract items and dollar amount changes included in the modification. Complete the following on WFLHD 10:

Block	Instructions
Reference No. of Document Being Continued	Type the contract modification number (e.g. Contract Modification No. 004) here.
Page of Pages	Include only the pages in the Contract Modification itself (i.e. the part you are sending to the contractor.)
Name of Offeror or Contractor	Contractor's Name
Item Number	e.g. M04 20401, or M04 60201A Use the FP or the Master Pay Item Listing to determine the appropriate item number. If you are decreasing the quantity of an item, which is already in the contract, with no change to the price, place the item number in the "existing" column. If you are increasing the quantity of an existing contract item, use a new item number such as M02 20401. This allows you and Finance to track the changes in quantities. If the item doesn't already exist in your contract (bid schedule or prior Contract Modification), put the item number in the "new" column.
Item Name [Supplies/Services]	e.g., Roadway excavation for M04 20401, or Culvert 24 inch for M04 60201A. You may use a unique alpha qualifier at the end of the New Contract Modification number for repeating items, ie culverts, pavement markings and equipment rental.
Quantity	The quantity added, deleted, or modified
Unit	e.g. square meter, metric ton, etc.
Unit price or lump sum price	Unit price or lump sum price
Amount	The product of the quantity and the unit price
Bottom block	Check "() <i>without modification</i> " if you have not revised any specifications. Otherwise, check "() <i>as modified . . .</i> "

CHAPTER 11

MEASUREMENT AND PAYMENT

11.1 MEASUREMENT OF QUANTITIES

The Standard Specifications prescribe methods of measuring quantities but are not intended to be all-inclusive. Refer to the plans, special contract requirements, and to this chapter of the manual for measurement details.

Each *Construction Requirements* section of the Standard Specifications contains a subsection entitled *Measurement*, stating what is to be measured and how it is to be measured. Further, the *Payment* subsection of each section states what work is covered by the payment. Work that is not specifically identified for payment is assumed to be a subsidiary obligation and no payment is required.

Occasionally, plans and special contract requirements will change the standard methods of measurement and payment, or include provisions for measurement and payment for items not in the Standard Specifications.

Before making any measurements on a project, study the plans, specifications, and special contract requirements to determine first, what is to be measured, and second, how it is to be measured.

11.1.1 Basic Types of Measurement

There are three basic methods of measuring contract items: contract quantity, staked or ordered quantity, and as-constructed quantity. The first is *contract quantity* (or lump sum). For these items the work authorized by the contract is verified and paid for. No detailed re-measurement is required. A Contract Modification must document changes or correction of errors. Examples of contract quantity would be mobilization and structural concrete (usually).

The second method is *staked or ordered quantity*. For this method, work is staked out or ordered by the Project Engineer, but before the work is performed, the quantity is defined and that is what is paid. Although it is necessary to verify that the work is completed, no detailed re-measurement is required. Examples of this method would be culverts, curbing, and earthwork (usually).

The third method is *as-constructed quantity*. The performance of work is authorized by the contract, and, subject to WFLHD inspection, it is performed, measured, computed (if necessary) and paid for. Examples of this method would be paving items paid by the ton, sub-excavation of soft spots, and watering.

11.1.2 Quantity Significant Figures

The payment precision for bid items is pre-set for the zero-estimate by the Contract Administration Specialist in Vancouver. For contractual reasons, do not change the decimal settings for any of the original contract bid items. Note that precision for some items may differ from those shown in the Special Contract Requirement "*Bid Schedule*" and the Plan sheet "*Summary of Quantities*".

The minimum number of significant decimal places to which quantities are measured, computed, and reported is generally dependant on the value or bid price of an individual unit; and with the degree of

precision with which it is practical to measure the item. Generally, significant figures for pay items are determined so that the minimum reported precision for any contract item should be the quantity that has a value between \$10 and \$100. Use this method to determine significant digits for contract modification pay items.

For example, assume a new clearing and grubbing item is added via a contract modification and the price is \$3,500 per hectare. One-hundredth (.01) hectare is valued at \$35. Therefore, the significant figures in the progress estimate will be to the .01. (Note: as described below, the item will be measured to the .001.)

Quantities should be measured to one significant figure beyond that required for reporting in the progress estimate. Enter the quantity as measured and the progress estimate program will round to the correct decimal place.

Quantities should be measured and calculated to one significant figure beyond that shown in the progress estimate and the contract.

Subexcavation, for instance, is normally paid to the nearest whole yard. When measuring and calculating, compute the quantity to the nearest tenth.

Example: Subexcavation shape is rectangular. The dimensions to the nearest tenth are; 10.3', by 3.7', by 46.9'.

The calculation is; $10.3 \times 3.7 \times 46.9 = 1787.4$ cubic feet.
 $1787.4 / 27 = 66.2$ Cubic Yards

Record for pay purposes, to one decimal beyond the significant figure for all entries throughout the life of the pay item. For example, in the case of individual subexcavation quantities similar to what is shown above, maintain a running total of the quantity and do not round to the nearest yard until final payment.

Estimate 1	Estimate 2	Round final payment to the nearest whole yard.
46.6 C.Y.	121.5 C.Y.	
99.4 C.Y.	44.9 C.Y.	
66.2 C.Y.	107.7 C.Y.	
100.1 C.Y.	171.1 C.Y.	
Subtotal 312.3 C.Y.	445.2 C.Y.	Total 757.5 C.Y. Rounds to 758 C.Y.

Round and pay to the nearest whole unit on progress estimates, however do not carry the rounding into calculation summary. Maintain the additional significant figure until final payment and round for the final quantity.

Use this methodology for all measured and calculated pay item quantities.

11.1.3 Measurement of Materials (Weight Basis)

For materials paid on a weight basis, a daily summary of all weighed (Weight Report, and Tare Report) and accepted loads (Spread Report) should be generated. See **Exhibits 11.1A, 11.1B, and 11.1C**. The reports should be filed with the tickets, indicating certified weight and acceptance, and which remain the original or source document.

When standard tickets are used, the scale person should fill them in completely, except for the station of placement, and shall deliver the original and duplicate to the truck driver, and retain the triplicate. If an original is lost or missing at the end of the shift and delivery on the road was accomplished, the triplicate may be used to verify the quantity provided it can be confirmed that the material was delivered.

When approved recording scales are used, the detail of checking and delivering material will vary according to the form of the tickets, but must be arranged so as to furnish both the scale person and spread person with a record of each load and the Contractor with a ticket issued as each load is weighed. The spread person on the road will fill in the station of placement, initial both copies, return the duplicate to the truck driver, and retain the original. The spread person completes the accepted loads spreadsheet (Spread Report) mentioned above in the first paragraph of this section.

It is critical that scale weight records, tickets, and the spread report are reconciled at the end of each shift. The inspector must review, check and reach agreement with the records provided by the Contractor for the day's production before starting a new day's production cycle.

Weighing by an accredited public weigh-master is acceptable, provided the same basic procedures described above are used.

Tare weights of each empty truck are to be determined at least twice daily and at such other times as the Project Engineer directs. It is important that tare weights be determined at random times during the day, and that the random selection process not be controlled by the truck driver or biased toward weighing when the fuel tanks are empty. The tare weights (and the date and time determined) should be recorded (**Exhibit 11.1C**).

Random checks [re-weigh] of trucks, already weighed and enroute to the project, should be done periodically. This will require turning a loaded truck around and having that truck re-weighed.

Where direct reading platform scales are used, the tare weight should be recorded (automatically or manually) on each ticket to give additional assurance that the correct tare weight was in fact set on the scale prior to reading the net weight. When belt scales, batch scales or other devices weigh the net weight of material without depending on gross truck weight, the ticket will be considered satisfactory when only net weight is shown. If scales of these types are used, a notation of scale type should be made in the scale weight records.

Unless otherwise specified in the special contract requirements, no deduction will be made from aggregate weights for moisture content. When such deduction is specified, its method of determination should be specified. If a correction is required but no method specified, a deduction based on the daily average moisture content determined by heat drying no less than three representative samples taken at random intervals from each 8-hour production should suffice. Depending on contract requirements, the actual deduction will probably be for excess moisture, i.e., the difference between actual and optimum moisture.

The Standard Specifications provide that weighing devices shall be accurate within 0.5 percent throughout the range of use, and shall be inspected, tested, and sealed. All weighing systems shall be inspected, tested and sealed prior to production. The Project Engineer should obtain a copy of the inspection documentation for the project files.

The National Institute of Standards and Technology (NIST), Handbook 44 is the standard by which scales are tested and sealed (<http://ts.nist.gov/ts/htdocs/230/235/h44-04.htm>). If the Project Engineer has

reason to doubt the accuracy of a weighing device at any time, the Contractor should be required to stop weighing operations and have the weighing device tested and resealed.

WFLHD-443M
(Rev 4/99)

TARE CHART

PAGE NO. _____

PROJECT: _____

LOADS NOT APPEARING ON
STREET DELIVERY REPORT
WILL BE DELETED UNLESS
SATISFACTORILY EXPLAINED.

DATE _____

ITEM NO.: _____

SOURCE NO.: _____

Pay Lot No.: _____

SHEET NO. ____ OF ____

TRUCK NO.					
TARE 1 (kg)					
TARE 2 (kg)					
TARE 3 (kg)					
TARE AVE. (kg)					
TRUCK TALLY					
NUMBER LOADS					
TARE WEIGHT (kg)					
TRUCK NO.					
TARE 1 (kg)					
TARE 2 (kg)					
TARE 3 (kg)					
TARE AVE. (kg)					
TRUCK TALLY					
NUMBER LOADS					
TARE WEIGHT (kg)					
TRUCK NO.					
TARE 1 (kg)					
TARE 2 (kg)					
TARE 3 (kg)					
TARE AVE. (kg)					
TRUCK TALLY					
NUMBER LOADS					
TARE WEIGHT (kg)					

TOTAL TARE WEIGHT (kg) _____

I CERTIFY THIS INFORMATION TO BE
C O R R E C T
BY: _____

DATE: _____

COMPANY: _____

[Save Data Only](#) [Clear Form](#) [Save Form & Data](#) [Email Form](#) [Retrieve Data](#)

TARE CHART, WFLHD 443 FORM

Exhibit 11.1C

11.2 ACTUAL COST WORK

The Standard Specifications provide for the performance of contract modification work on an actual cost basis when it is not possible to define the quantity of work and negotiate a price prior to the performance of the work being accomplished. Actual cost pricing should be used only when it is not practically possible to establish fixed unit prices or lump sum prices.

When actual cost work is agreed to, or when work is commenced on an actual cost basis pending negotiation of unit or lump sum prices, the Project Engineer or inspector monitoring the work should agree with the Contractor on the exact hours for labor and equipment (as well as materials) associated with the work each shift.

Strict adherence to the requirement that the cost records be maintained and signed daily as the work progresses is essential.

11.2.1 Daily Records of Actual Cost Work

When actual cost work is being performed a detailed record of labor, material, and equipment information should be documented on the "Contractor's Daily Record of Construction Operations" (WFLHD 465).

- **Labor** - The name and complete minimum wage schedule description, i.e., laborer unskilled; or operator, asphalt milling machine. The Project Engineer must ascertain that the daily records of hours worked do not exceed the hours shown on the Contractor's payrolls.
- **Equipment** - Complete Corps of Engineers ownership and operating rate information, e.g., Dozer, Caterpillar, D-8L, 250 kW; and the Corps unit number if available, e.g., #T15CA015. In addition, the contractor may have equipment rental receipts or reliable equipment operation costs.
- **Material** - A description of the material and source together with certification or test data and invoices or other cost information.

The original copies of the signed WFLHD 465 and the materials invoices are the minimum documentation required for actual cost work. All pertinent information should be recorded on the WFLHD 465, and not in various inspectors' diaries.

11.2.2 Summary of Actual Cost Work

Current monthly summaries of actual cost work should be prepared. Separate summaries should be kept for each actual cost contract modification. The contractor may be paid only after the contract modification has been signed by the Government. Computations supporting the subtotals and totals should be attached to the daily sheets with each bid item. This can be done by the use of a copy of the adding machine tape or computer spreadsheet, which will also facilitate checking.

11.3 PROMPT PAYMENT ACT

11.3.1 FAR Clauses

The requirement for processing progress payments included in *FAR Clause 52.232-5, Payments Under Fixed Price Construction Contracts*, *FAR Clause 52.232-27, Prompt Payment for Construction Contracts*, and FP Subsection 109.08, Progress Payments. These clauses appear in each contract and should be reviewed in detail. The following guidance addresses the highlights and common problems.

11.3.2 Requirements

Some of the basic requirements of the Prompt Payment Act are:

- The Government is required to make payment to the Contractor within 14 days after a **valid** invoice is received at the designated billing office from the Contractor.
- The Government must stamp the Contractor's invoice with the "date received". Even if returned, all invoices should have the Govt "received" stamp on the invoice. Always retain the original and return a copy to the Contractor.
- The Government must advise the Contractor in writing within 7 days if the invoice is defective.
- The Government is obligated to pay the Contractor interest if payment is not made in a timely manner. This interest payment is made automatically, and is based on date the Contractor's Invoice is received.
- The Contractor may only invoice subcontractor's work for which it is committed to paying the subcontractor within 7 days of payment by the Government.
- The Contractor may be obligated to pay interest to the Government and an interest penalty to the subcontractor on any amounts for subcontractor work it invoices, and is paid by the Government; and fails to pay the subcontractor within 7 days.
- The Government is not to become involved in disputes between subcontractors and contractors.

11.3.3 Preconstruction Conference

The payment and invoice process as well as the Contractor's obligations in this process should be emphasized at the preconstruction conference. In particular the Contractor should understand that failure to provide required materials documentation, test reports and certifications will result in nonpayment for the work in question. Section 109.08 of the contract provides details on invoice requirements.

11.4 SUBCONTRACTOR PAYMENTS

11.4.1 Prompt Payment Requirements

If the Contractor invoices the Government for work performed by a subcontractor, the Contractor must pay the subcontractor within 7 days of receiving payment from the Government. Failure to make prompt payment results in an interest penalty due from the Contractor to the Government. Interest continues as long as the Contractor has received payment from the Government, but failed to pay the subcontractor. If the Contractor has violated the terms of the subcontract by failure to make payment, it may owe a second interest penalty to the subcontractor. Generally, the Government is not a party to the latter obligation, and the Project Engineer should not attempt to monitor or enforce subcontract provisions.

There is no prohibition against a Contractor withholding payment from a subcontractor for cause – such as producing defective work (whether or not the Government considers it defective), or not completing its work on time. However, the Contractor cannot invoice the Government for work for which it is *temporarily* withholding payment from the subcontractor. *Temporarily* means the Contractor recognizes an obligation to pay the subcontractor as soon as the problem, which precipitated the withholding, is corrected.

If the withholding from the subcontractor is permanent, that is considered a de facto reduction in the amount of the subcontract and should be reported in the invoice documentation as such. For example: A subcontractor building a box culvert is unable to obtain credit to buy ready mix concrete. The prime purchases the concrete and deducts payment from the subcontractor's payments. This transaction reduces the amount of the subcontract. The prime may invoice the Government for the full amount of the completed work, and is not obligated to pay interest to the subcontractor or to the Government.

The Prompt Payment Act takes precedence over the terms of the Contract. For example, the Contract may provide that temporary traffic control devices are paid at 50% on delivery to the site. However, the Contractor may have a subcontract, which provides payment at 5% per month for the first 20 months of the Contract. In this case the Contractor may invoice the Government only for the amounts it will pay the subcontractor, plus a proportionate share of any overhead and profit markup if applicable. The Project Engineer will often not have enough information to know if there is a significant difference in subcontract payment terms and those in the contract. A comparison of the tabulation of the status of all subcontract payments required by FP Section 109.08 of the Contract, with the Project Engineer's knowledge of how much subcontracted work has been paid for under the Contract, will often give indications of problems which should be questioned.

11.4.2 Handling Subcontractor Non-Payment Complaints

Occasionally, subcontractors or even individuals may contact the Project Engineer about unpaid bills for labor, materials or services furnished to the project, and request help in collecting payment from the Contractor or subcontractors.

Complaints from subcontractors who say they have not been paid have two implications under the Contract. The first is a possible Miller Act claim by the subcontractor against the Contractor's surety. The second is a possible violation of the Prompt Payment Act, and occurs when the payment in question was invoiced by the Contractor and paid by the Government, but not passed on to the subcontractor.

Exhibit 11.4A provides guidelines for handling subcontractor non-payment complaints. The Project Engineer should seek advice from the COE prior to preparing correspondence to the contractor or subcontractor.

In the United States, the law requiring contract surety bonds on federal construction projects is known as the Miller Act (40 U.S.C. 3131 *et seq.*). This law requires a contractor on a federal project to post two bonds: a performance bond and a labor and material payment bond.

The Miller Act payment bond covers subcontractors and suppliers of material who have direct contracts with the prime contractor. These are called first-tier claimants. Subcontractors and material suppliers who have contracts with a subcontractor (in this case subcontractor does not include suppliers), are also covered and are called second-tier claimants. Anyone further down the contract chain is considered too remote and cannot assert a claim against a Miller Act payment bond posted by the contractor. Subcontractors and material suppliers who have contracts with a supplier are not covered by the Miller Act.

When a non-payment complaint is received, the Project Engineer should provide a Miller Act letter (**Exhibit 11.4B**) to the subcontractor. The letter will advise the subcontractor of their rights under the Miller Act. Include, as attachments to the letter, a copy of the pertinent parts of the law itself (**Exhibit 11.4C**) and a copy of the payment bond.

If there is an apparent violation of the Prompt Payment Act, write to the Contractor detailing the allegations and facts, as you know them, and request a written explanation from the Contractor. Provide a copy of the letter to the Contractor's bonding company. See **Exhibit 11.4D** for an example letter. Note that the Government's only interest in underpayments to subcontractors is possible violations of the Prompt Payment Act and the interest that might therefore be due the Government. The Government should avoid becoming involved in disputes between the Contractor and its subcontractors; and especially avoid ordering the Contractor to pay subcontractors. The Government's position is simply that if the Contractor is not paying the subcontractors, it cannot invoice the Government for the subcontractor's work. It should be made clear to the Contractor that WFLHD is not a policing or audit agency; and if disputes linger on, or appear to indicate improper actions of the Contractor prejudicial to the Government, we will have no choice but to request intervention of an appropriate legal authority such as the DOT Office of the Inspector General.

COMPLAINT	RESPONSE
Verbal complaint from subcontractor or supplier of nonpayment.	Verbally advise subcontractor/supplier that no action can be taken unless a written complaint is provided.
	Verbally advise subcontractor/supplier that in order to ascertain a violation of the Prompt Payment Act, the Government needs a detailed statement of payments under the subcontract, dates payments made, and amounts subcontractor/supplier believes were due on those dates.
	Verbally advise contractor superintendent of complaint and remind him/her of Prompt Payment Act requirements.
	Document all exchanges in diary. No further action in absence of written statement/complaint.
Written complaint from subcontractor/supplier of nonpayment, but without detailed accounting of amounts paid and dates.	Furnish copy of bond and Miller Act information to subcontractor/supplier.
	Request a statement of payments under the subcontract, dates payments made, and amounts subcontractor/supplier believes were due on those dates.
	No further action unless statement of payments is provided.
Written complaint from subcontractor/supplier of nonpayment, including detailed accounting of amounts paid and dates.	Furnish copy of bond and Miller Act information to subcontractor/supplier.
	Compare subcontractor/supplier's detailed statement of payments, Contractor accounting of subcontractor payments, and Government's payments for contract items known to be part of the subcontract.
Subcontractor statement of payments generally agrees with Contractor's accounting and amounts paid by Government for subcontracted work.	No further action. Subcontractor may have recourse under Miller Act, but no apparent Prompt Payment Act violation.
Subcontractor statement indicates payments less than corresponding invoiced percentages of contract items associated with the subcontract.	Write letter to Contractor requesting resolution of payment discrepancies.
Contractor fails to respond to letter requesting resolution of alleged underpayment.	Notify Contractor in writing that without an adequate response to nonpayment allegations, further invoices including the payment in question must be presumed to be defective.
	Refer file to Legal Counsel for possible referral to DOT Office of Inspector General as false claim.
Contractor responds that payment information provided by subcontractor/supplier is in error and that all payments have been made in accordance with the Prompt Payment Act, but does not provide credible evidence that this is the case.	Refer file to Legal Counsel for advice on possible nonpayment of invoices and referral to DOT Office of Inspector General as false claim.
Contractor responds in a way that confirms that payments made to subcontractor/supplier have been less than those invoiced the Government for the contract items associated with the subcontract.	On next invoice, require Contractor to debit appropriate interest from next progress payment. Require debit of overpayment unless Contractor pays subcontractor/supplier by then.

GUIDELINES FOR HANDLING NON-PAYMENT COMPLAINTS

Exhibit 11.4A

Dear Ms. Neidelstrom:

This is to acknowledge your notice of nonpayment related to materials provided on this project which is being administered by this office of the Federal Highway Administration.

In accordance with the Miller Act (Title 40, United States Code, Section 270), the prime contractor, XYZ Construction, submitted a payment bond, under which it bound itself through its bonding company (surety) to pay all legitimate claims of its subcontractors and suppliers under the contract. A copy of the pertinent sections of the Act (and the Payment Bond for the contract) is enclosed.

NOTE: The following paragraph may be omitted if the complainant obviously does have a contractual relationship with the prime. DELETE these instructions.

If you do not have a direct contractual relationship with the prime contractor, you must notify the prime contractor in writing of your request for payment within ninety days of the last day you performed the labor or furnished the supplies. You have the right, after failing to receive a response to your request for payment from the prime contractor, to file a claim under the Miller Act.

In addition, this contract is subject to the terms of the Prompt Payment Act. This law obligates the contractor to make payment on any work performed by subcontractors and which it invoices to. And is paid by the Government. If you provide this office with a detailed accounting of the work you have performed on the contracts, and the date/amounts you have been paid for the work, we will evaluate if there has been an apparent violation of the Prompt Payment Act.

If you choose to file a claim under the Miller Act, please contact **Jane Doe**, WFLHD Construction Operations Engineer. Please note that neither the Miller Act, the contract, nor any other Federal or State laws or regulations creates any right for you to bring this type of claim directly against the Federal Highway Administration; or the United States Government; or permits payment by the Government directly to you. Your exclusive recourse under the law is against the prime contractor and its surety. If you have any further questions on this matter please contact this office.

Sincerely,

Project Engineer

EXAMPLE MILLER ACT LETTER

Exhibit 11.4B

The Miller Act
US Code: Title 40, 3131 et seq. (revised 1/28/2005)

3131. Bonds of contractors of public buildings or works

(a) Definition.— In this subchapter, the term “contractor” means a person awarded a contract described in subsection (b).

(b) Type of Bonds Required.— Before any contract of more than \$100,000 is awarded for the construction, alteration, or repair of any public building or public work of the Federal Government, a person must furnish to the Government the following bonds, which become binding when the contract is awarded:

(1) Performance bond.— A performance bond with a surety satisfactory to the officer awarding the contract, and in an amount the officer considers adequate, for the protection of the Government.

(2) Payment bond.— A payment bond with a surety satisfactory to the officer for the protection of all persons supplying labor and material in carrying out the work provided for in the contract for the use of each person. The amount of the payment bond shall equal the total amount payable by the terms of the contract unless the officer awarding the contract determines, in a writing supported by specific findings, that a payment bond in that amount is impractical, in which case the contracting officer shall set the amount of the payment bond. The amount of the payment bond shall not be less than the amount of the performance bond.

(c) Coverage for Taxes in Performance Bond.—

(1) In general.— Every performance bond required under this section specifically shall provide coverage for taxes the Government imposes which are collected, deducted, or withheld from wages the contractor pays in carrying out the contract with respect to which the bond is furnished.

(2) Notice.— The Government shall give the surety on the bond written notice, with respect to any unpaid taxes attributable to any period, within 90 days after the date when the contractor files a return for the period, except that notice must be given no later than 180 days from the date when a return for the period was required to be filed under the Internal Revenue Code of 1986 (26 U.S.C. 1 et seq.).

(3) Civil action.— The Government may not bring a civil action on the bond for the taxes—

(A) unless notice is given as provided in this subsection; and

(B) more than one year after the day on which notice is given.

(d) Waiver of Bonds for Contracts Performed in Foreign Countries.— A contracting officer may waive the requirement of a performance bond and payment bond for work under a contract that is to be performed in a foreign country if the officer finds that it is impracticable for the contractor to furnish the bonds.

(e) Authority to Require Additional Bonds.— This section does not limit the authority of a contracting officer to require a performance bond or other security in addition to those, or in cases other than the cases, specified in subsection (b).

3132. Alternatives to payment bonds provided by Federal Acquisition Regulation

(a) In General.— The Federal Acquisition Regulation shall provide alternatives to payment bonds as payment protections for suppliers of labor and materials under contracts referred to in section 3131 (a) of this title that are more than \$25,000 and not more than \$100,000.

(b) Responsibilities of Contracting Officer.— The contracting officer for a contract shall—

(1) Select, from among the payment protections provided for in the Federal Acquisition Regulation pursuant to subsection (a), one or more payment protections which the offeror awarded the contract is to submit to the Federal Government for the protection of suppliers of labor and materials for the contract; and

(2) specify in the solicitation of offers for the contract the payment protections selected.

MILLER ACT PROVISIONS

Exhibit 11.4C

3133. Rights of persons furnishing labor or material

(a) Right of Person Furnishing Labor or Material to Copy of Bond.— The department secretary or agency head of the contracting agency shall furnish a certified copy of a payment bond and the contract for which it was given to any person applying for a copy who submits an affidavit that the person has supplied labor or material for work described in the contract and payment for the work has not been made or that the person is being sued on the bond. The copy is prima facie evidence of the contents, execution, and delivery of the original. Applicants shall pay any fees the department secretary or agency head of the contracting agency fixes to cover the cost of preparing the certified copy.

(b) Right to Bring a Civil Action.—

(1) In general.— Every person that has furnished labor or material in carrying out work provided for in a contract for which a payment bond is furnished under section 3131 of this title and that has not been paid in full within 90 days after the day on which the person did or performed the last of the labor or furnished or supplied the material for which the claim is made may bring a civil action on the payment bond for the amount unpaid at the time the civil action is brought and may prosecute the action to final execution and judgment for the amount due.

(2) Person having direct contractual relationship with a subcontractor.— A person having a direct contractual relationship with a subcontractor but no contractual relationship, express or implied, with the contractor furnishing the payment bond may bring a civil action on the payment bond on giving written notice to the contractor within 90 days from the date on which the person did or performed the last of the labor or furnished or supplied the last of the material for which the claim is made. The action must state with substantial accuracy the amount claimed and the name of the party to whom the material was furnished or supplied or for whom the labor was done or performed. The notice shall be served—

(A) by any means that provides written, third-party verification of delivery to the contractor at any place the contractor maintains an office or conducts business or at the contractor's residence; or

(B) in any manner in which the United States marshal of the district in which the public improvement is situated by law may serve summons.

(3) Venue.— A civil action brought under this subsection must be brought—

(A) in the name of the United States for the use of the person bringing the action; and

(B) in the United States District Court for any district in which the contract was to be performed and executed, regardless of the amount in controversy.

(4) Period in which action must be brought.— An action brought under this subsection must be brought no later than one year after the day on which the last of the labor was performed or material was supplied by the person bringing the action.

(5) Liability of federal government.— The Government is not liable for the payment of any costs or expenses of any civil action brought under this subsection.

(c) A waiver of the right to bring a civil action on a payment bond required under this subchapter is void unless the waiver is—

(1) in writing;

(2) signed by the person whose right is waived; and

(3) executed after the person whose right is waived has furnished labor or material for use in the performance of the contract.

3134. Waivers for certain contracts

(a) Military.— The Secretary of the Army, the Secretary of the Navy, the Secretary of the Air Force, or the Secretary of Transportation may waive this subchapter with respect to cost-plus-a-fixed fee and other cost-type contracts for the construction, alteration, or repair of any public building or public work of the Federal Government and with respect to contracts for manufacturing, producing, furnishing, constructing, altering, repairing, processing, or assembling vessels, aircraft, munitions, materiel, or supplies for the Army, Navy, Air Force, or Coast Guard, respectively, regardless of the terms of the contracts as to payment or title.

(b) Transportation.— The Secretary of Transportation may waive this subchapter with respect to contracts for the construction, alteration, or repair of vessels when the contract is made under sections 1535 and 1536 of title 31, the Merchant Marine Act, 1936 (46 App. U.S.C. 1101 et seq.), or the Merchant Ship Sales Act of 1946 (50 App. U.S.C. 1735 et seq.), regardless of the terms of the contracts as to payment or title.

MILLER ACT PROVISIONS (continued)**Exhibit 11.4C**

Dear Mr. McDonald:

Your subcontractor, Fishaven Construction, Inc. has advised us that payment for structural steel furnished on the above-referenced project is past due. According to Fishaven, \$25,000 on the \$219,000 subcontract was paid on October 14, 2004 and no further payments have been received. Your invoice dated December 1, 2004 billed the Government for 90% (\$315,000) of the \$350,000 bid for Item 55501. The Government paid you this amount on December 12, 2005.

Fishaven has been advised of their rights under the Miller Act. In addition, Fishaven allegation indicates a possible violation of the Prompt Payment Act, which obligates the prime contractor to pay subcontractors within 7 days of receipt of payment by the Government, any amounts, associated with the subcontractor's work, which have been invoiced by the contractor and paid by the Government. You are therefore requested to provide, within 30 days, a written response to Fishaven's allegation.

If Fishaven has been underpaid as indicated by the allegations you must make payment in full, including any interest due the subcontractor, prior to your next invoice to the Government, and provide the Government with documentation to that effect. If you choose not to make payment to Fishaven, the amounts of all overpayments by the Government must be rescinded and credited to the Government on your next invoice.

In addition, if Fishaven allegation is valid, you are obligated to credit the Government with interest on the amount of all overpayments for the period of time from when they were due to be paid to the subcontractor (December 19) until they were paid, or until they were rescinded and credited to the Government. The Treasury Department interest rate for the six months ending December 31, 1993 was 6.52%, and the rate for the first six months of 1994 is 6.34%.

Your failure to resolve this apparent violation of the Prompt Payment Act by the due date of your next invoice and progress payment may result in the invoice being deemed defective and returned to you for correction. If the Government cannot determine from your response whether a violation of the Prompt Payment Act has occurred, the issue may be referred to the Department of Transportation, Office of the Inspector General for investigation.

Sincerely,

Project Engineer

EXAMPLE PROMPT PAYMENT ACT LETTER

Exhibit 11.4D

11.5 PROGRESS PAYMENT PROCESS

The following sections address the process for making payment to the contractor. For the Project Engineer, the payment process starts when the Contractor provides pay notes and essentially ends when the approved invoice is sent to the Contract Administration Specialist in Vancouver for processing and payment.

11.5.1 Pay Notes

The Contractor is to provide pay notes to the Project Engineer as the work is completed, or at definite intervals for items that continue on a daily basis (i.e., Flaggers, Pilot Car) or will extend beyond the invoice closing date (i.e., Excavation). The contractor should have submitted all pay notes by the estimate closing date, except those lump sum items that are computed based on percentage complete of all items (Mobilization, Surveying and Staking, etc.). The Daily Record of Miscellaneous Items form (**Exhibit 11.5A**) is the most common format form used for pay notes.

Units of measurement on the pay notes must be consistent with the required method of measurement specified in the Contract (bid schedule or summary of quantities). The pay notes should state the method of measurement. E.g., was the measurement estimated, paced, chained, or wheeled?

All pay notes are to be stamped with the "Received By" and "Date" stamp when received. The pay notes are to be checked for accuracy, including pay decimal, and that the work meets contract requirements, and if correct signed by the Project Engineer or an authorized inspector. This may include doing actual measurements in the field or going over your notes taken when the work was being completed.

If a submitted pay note is found to be incorrect due to computation errors, or if there is any disagreement with the pay quantity or information provided, the Project Engineer should keep the original pay note (that is incorrect or that they do not agree with) for the file and return a copy to the contractor explaining any deficiency. Do not return the original pay note back to the Contractor for corrections. Be sure to record on both the original retained the pay note, as well as the copy returned to the Contractor, the date when the pay note is returned for correction. This provides the paper trail and time line for documents, should a dispute arise at a later time. When the disagreement is settled or corrections made, a new pay note should be developed by the contractor. When received, if agreeable, process the pay note for estimate purposes. Do not attempt to correct or modify contractor pay notes.

The Project Engineer should only approve pay notes for work which the Contractor has provided the required documentation, test results, or certifications.

The basis for percentage payments and temporary items such as materials on hand (MOH) should be documented on the pay note.

11.5.2 Entering Data

After the pay notes have been checked and signed, you will need to enter the quantities into the “Modify Daily Production Data” portion of the *Progress Estimate* program. The only information entered is the date the work was completed (or date on the pay note), the number of days of production, and the quantity on the pay note. Also always include information in the notes area. These notes may include the stations of the work included on the pay notes, the status of the item of work (50% complete, estimated to be 70 % complete), or any other pertinent information pertaining to the quantity of work on the pay note.

Even if a pay note has been submitted and the quantity was zeroed out for being incorrect, always enter it into the “Production Data Summary” as zero and explain why it was zeroed out in the note area. In this case, it is not necessary to enter days of production. The production summary quantity will show up blank when a zero is entered into it, this is why these note areas always need to be completed and the quantity explained.

Once the pay note has been entered into the “Production Data Summary,” stamp the pay note with the “Entered to Record” stamp. Make a copy of all pay notes including those changed or zeroed out and return them to the Contractor as soon as possible.

When entering new item numbers follow the directions provided later in this chapter.

11.5.2.1 Pay Factor Adjustments

Any material pay factor adjustment to Contract unit prices should be documented with a QL-Pay printout or manual computations. The contractor should receive full pay for 100% of the quantity used under the original bid item. A new pay item should be created to pay for the material factor adjustment. This is to be done after item of work is completed to prevent multiple entries at different pay factors for the same item. In the item description, include a reference back to the original bid item, and describe the adjustment being made. See **Exhibit 11.5B** for adding new pay items.

11.5.2.2 Probables

As part of the monthly progress payment procedure, the Project Engineer should estimate the total expected quantity for each item – its *probable*, in the Progress Estimate program. Probable quantities translate to probable costs. The Contract bid quantity may be used for each item initially, unless there is information to the contrary. It is important to note that changing the probable in the Progress Estimate program in no way effects the obligated amount for the Contract. The obligations are only changed by an executed Contract Modification. Keeping the probable amounts updated in the Progress Estimate Program is the best way to closely track the Contract expenditures and forecast Contract costs.

11.5.2.3 Preparatory Work

General mobilization and preparatory work for starting construction is included in the Mobilization pay item. See Section 151 of the Standard Specifications. Preparatory work, or the beginning stages of work on a particular item should be included in the Contractor’s invoice and paid as an agreed percentage of that item. While it is possible to pay preparatory work on an actual expenses basis, this is not recommended because it entails additional bookkeeping and control to prevent overpayment. See **Exhibit 11.5C** for Guidelines for Percentage Payments for Partially Complete Work.

11.5.2.4 Materials to be Incorporated into the Work (Material on Hand)

Partial payment for preparatory work and material on hand is discretionary (see FAR Clause 52.232-5(b)(2)). Materials on hand (MOH) can be shown on the progress estimate as line items in one of two ways. These methods are shown in **Exhibit 11.5B**. One method places the MOH after the original contract items, while the other method places the MOH items grouped together at the bottom of the estimate. When using the current progress estimate program, be sure to check the “materials on hand” box when creating this item, which will not allow the item to have probables. Since this is a temporary item that will ultimately be *zeroed out*, it should not increase the job *probables*. Partial payments should not be made where the payment would place undue risk on the Government.

Materials on hand (MOH) may be included in the Contractor's invoice and paid for as one or more separate (temporary) line items, provided:

- The materials are stored on site or at an acceptable offsite location. If materials are stored offsite the Contractor must provide documentation that it has acquired title to the materials. A paid invoice from the supplier to the Contractor, including evidence to show the material will be used on the FHWA project, is normally adequate.
- Payment does not exceed 80% of the value of the Item for which the MOH is intended.
- The materials are designated for incorporation into the work. Form lumber, explosives, and diesel fuel cannot be paid as stockpiled materials. They should be included in the mobilization item. MOH cannot be paid for living and perishable items.
- There are test reports, certifications or other reasonable documentation that the materials comply with Contract requirements, or that the item into which they will be incorporated will comply with those requirements. Though not required, it is prudent to enter material production results into QL-Pay to quantify the risk that the government has for this MOH.

Payment for stockpiled materials is intended to allow the Contractor to order materials sufficiently in advance of the work to avoid delivery delays. Payment does not constitute *acceptance* of the material, although the Government may argue that it legally *owns* the materials in the event of a default. It is also not intended as a means of providing advance payments. Payments must represent the reasonable value of the materials as compared to the bid prices for the work into which they will be incorporated. Whenever there is payment for MOH, such payment is covered by the conditions of the Prompt Payment Act, i.e., the Contractor is required to make payment to the subcontractor (supplier) within 7 days of receiving payment from the Government.

A request for MOH by the Contractor should be made in writing, and show sufficient detail in the cost breakdown to support reasonable value for the request. It is the responsibility of the Contractor to support the request for payment of MOH.

As the materials previously paid for are incorporated into the work and paid under Contract items, the temporary line item created to pay for them must be reduced or *zeroed out* accordingly.

11.5.2.5 Retainage and Liquidated Damages for Poor Progress

Retainage is money withheld from progress payments. FAR Clause 52.232-5(e) (see also Section 155 of the Special Contract Requirements) allows retainage of 10 percent of any progress payment when progress is unsatisfactory. Unsatisfactory progress means one of the following:

- Contractor is significantly behind the approved construction schedule.
- Contractor is following a construction schedule, which shows completion beyond the contract fixed completion date

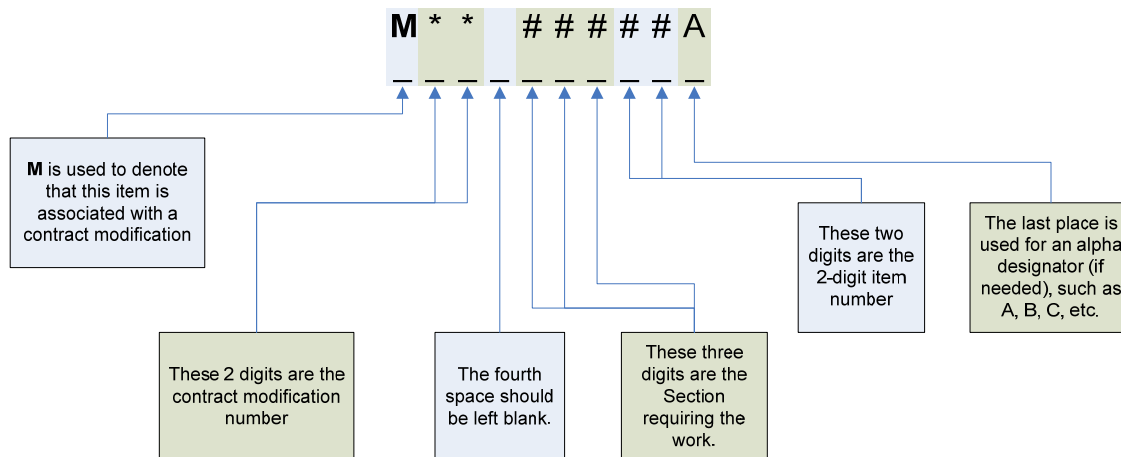
- Contractor does not have an approved construction schedule, or the originally approved schedule has been rendered obsolete and invalid, thereby making it impossible to determine if progress is satisfactory.

Retainage is not applied to the entire amount of payments to date, but only to those payments earned since progress became unsatisfactory. Withholding of additional retainage is discontinued as soon as progress and the approved schedule are demonstrated to be consistent. However, previously withheld retainage will continue to be withheld until the Contractor demonstrates an ability to complete the project by the contract completion date (as modified by any Contract Modifications or incentives).

Once the Contract completion date has passed without completion, the Government is to withhold liquidated damages for each day of delay, in accordance with Subsection 108.04 of the FP. Whereas retainage is a *discretionary* condition of the Contract, liquidated damages are mandatory unless there is a contract modification modifying or waiving them. If substantial retainage *and* liquidated damages are being withheld, it is reasonable to estimate what the final amount of liquidated damages will be, and to assess a combined amount of retainage and current liquidated damages not to exceed this amount. This is done by reducing the retainage to some number less than 10 percent of the final contract amount. This situation should be discussed with the COE.

11.5.2.6 Adding Items

All pay items associated with contract modifications should be listed separately and identified as to the number of the contract modification. Use the following numbering convention for contract modification items.



The FP-03 contract item numbers (in metric and US Customary units) can be found at:
http://www.wfl.fhwa.dot.gov/design/resource/Pay_Items_03.xls

See **Exhibit 11.5B** for examples of how to add contract modification items, adjust materials payments based on QL-Pay, and add contractor interest payments.

FORM FHWA 17-348 (12/2007)

U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 Western Federal Lands Highway Division
 610 E. 5th St. Vancouver, Washington 98661

REGION SEVENTEEN
 FP-03 109.01

(a) Project Name: _____ Project Number: _____
 (b) Item Number: _____ (c) Date work performed: _____

DAILY RECORD OF MISCELLANEOUS ITEMS	
(f) Calculations*:	
(g) Supporting sketch and details*:	
(h) Name of person measuring work: _____	
(i) Interim or final measurement (circle one)	
(d) Location:	(e) Measured quantity:
Total quantity:	

(j) I certify the above quantity was performed and/or used in the construction of this project.

 Contractor Representative

 FHWA Representative

*Attach additional sheets if necessary.

**DAILY RECORD OF MISCELLANEOUS ITEMS
 Exhibit 11.5A**

Description	Allowance(Cumulative)
Clearing and Grubbing	
Felled and slashed	35
Bucked and piled (slash, brush and logs)	60
Grubbed	75
Burned or chipped and removed	98
Substantially complete including cleanup	100
Excavation and Embankment	
Pioneered	5
Drilled	20
Blasted	35
Roughed out to grade	85
Roadbed finished to grade	90
Slopes seeded	98
Substantially complete including cleanup	100
Structural Excavation	
Excavation complete	85
Backfill complete	98
Substantially complete including cleanup	100
Aggregate Courses	
Crushed and stockpiled onsite	50
Placed on roadway	80
Spread, compacted and tested	98
Substantially complete including cleanup	100
Asphalt Pavements	
Aggregates crushed and stockpiled onsite	50
Placed, compacted and tested	98
Substantially complete including cleanup	100
PCC Pavement	
Forms set	35
Concrete in place	90
Forms removed and testing complete	98
Substantially complete including cleanup	100
Concrete Structures	
Falsework erected	10
Forming complete	20
Concrete in place	80
Forms removed	90
Concrete tested and finished	98
Substantially complete including cleanup	100
Steel Structures	
Falsework erected	10
Steel in place	80
Bolting and welding complete	90
Painting complete	98
Substantially complete including cleanup	100
Notes:	
1. These percentages are typical. They may be adjusted based on a detailed analysis of circumstances on a given project.	
2. Whenever partially complete work entails continuing maintenance, an appropriate percentage should be retained to cover those costs.	

GUIDELINES FOR PERCENTAGE PAYMENTS FOR PARTIALLY COMPLETE WORK

Exhibit 11.5C

11.5.3 Filing

Once the pay note information is entered into the estimate program, stamped, and copied for the contractor, the original is then filed in the appropriate section of the Items book(s).

11.5.4 Preparing Receiving Report

Under the Prompt Payment Act the Government's estimate (Supporting data report printout from the *Progress Estimate Program*) is defined as the Receiving Report. Its purpose is to validate the accuracy of the Contractor's invoice. See **Exhibit 11.5D** for an **Example Receiving Report**. Together, the Government's receiving Report and the Contractor's invoice initiate payment.

In order for payment to be made, the Contractor's invoiced quantity and unit price for any item must not exceed the receiving report quantity and unit price for that item. Therefore, the Contractor must have access to measurement, quantity, and pay factor information that only the Project Engineer may have; at the time the receiving report is prepared. For example: allowances for partially completed work or computation of quantities based on survey notes which only the Government has access to.

All quantities shown on the receiving report must be documented in the bid item summaries and cross-referenced to an appropriate field book or file.

All contract items and probable quantities should be shown on the receiving report so that the status of the probable contract amount can be monitored easily. Probable quantities are normally not provided to the Contractor unless they are requested, or unless the Contractor needs to know (i.e., to order materials).

11.5.5 Compare and Reconcile the Contractor's Invoice with the Receiving Report

Subsection **109.08 Progress Payments** of the SCR states the Project Engineer will meet with the contractor, by appointment at the project office, within 4 days of the closing date to go over the Government's receiving report.

Make sure that all received pay notes have been entered into the estimate program and they appear in the receiving report prior to meeting with the Contractor.

To help expedite the payment process it is recommended that the contractor bring the original signed certifying cover letter to this meeting. Set it aside until all quantities on the contractors invoice are correct.

Go through the receiving report item by item with the Contractor to verify quantities that have been approved for payment. If there are differences in the quantities between the receiving report and the Contractor's information this will have to be reconciled. As mentioned previously in this section, the Government cannot pay for more than the Contractor is requesting on any one item or in total. If the government does not have particular pay notes, have the contractor locate and submit them, as payment cannot be made without them.

While the Project Engineer should be reasonable in resolving disputes or differences with the Contractor on what the receiving report should include, the Project Engineer has the final say (within the terms of the Contract), and agreement on the content of the receiving report is not required.

11.5.6 Contractor's Invoice

11.5.6.1 Invoice Requirements

The Contractor's invoice package must contain the items listed in Section 109 of the FP or as modified by the Special Contract Requirements. See **Exhibit 11.5E** for an Example Contractor's Certification and Invoice. The Contract specifies where the invoice must be sent or delivered in order for the 14-day *clock* to start. During the construction season, this is typically the Project Field Office. During the off-season, invoices are normally sent to the Division Office. It is important to stamp the invoice when received with the "Received By" and "Date" stamp (make sure the invoice is correct before stamping the certifying cover letter, you set aside earlier in 11.5.5). It is also important to know the maximum time it may be retained during processing by the billing office, and still be within the 14-day limit for payment. Finance is unable to process pay estimates the last few days of the month, and much of September.

There are generally three major components of a Contractor invoice:

- Tabulation of quantities and unit prices. No quantity for an individual item should exceed the quantity for that item on the Government's receiving report. However, quantities for certain items may be less - for example if a subcontract provided that certain work not be paid for until complete (see below). Payment would then be based on the lower (contractor's) quantity.
- Accounting of subcontractors, with the total amounts, amounts previously paid, and amounts to be paid from this estimate.
- Signed certification conforming to FAR Clause 52.232-5(c)

FAR Clause 52.232-27 requires *interest penalties* and similar adjustments to also be included in the invoice. e.g., if the Contractor previously invoiced the Government for work that it then withheld from a subcontractor, it is required to show the interest penalty (credit to the Government) on the invoice. We expect this sort of adjustment to be very infrequent. However, if the occasion arises, and the Contractor needs the correct current interest rate, the information should be obtained from the COE.

Project No.: _____ Project Name: _____

Contract No.: _____ Award date: _____

The certification, Subcontractor listing, and attached itemized request for payment of \$ _____ serves as the contractor's invoice for work performed during the period indicated below, and under the contract cited.

CONTRACTOR CERTIFICATION
[FAR Clause 52.232-5 & FAR 52.232-27]

I hereby certify, to the best of my knowledge and belief, that:

- (1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;
- (2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements and the requirements of Chapter 39 of Title 31, United States Code; and
- (3) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract.

Contractor Company Name

Date signed

Submitted by: _____
Print name and Title

Estimate Number

Submitted by: _____
Signature

_____ through _____
Dates for Progress payment period

Subcontractor	SF1413 Submitted Y/N	Total Amount of Subcontract	Previous Payments	Amount Included in this Estimate*	Cumulative Retent through this Estimate

* Excludes any retent included in the right-most column. ___ Check if continued on additional page WFLHD 500 Rev. 6/07

CONTRACTOR'S INVOICE (CERTIFICATION PAGE)

Exhibit 11.5E

PROGRESS ESTIMATE NO. 003
 OR FS 108-2(11)
 HAPPY TRAILS CREEK ROAD

FOR WORK PERFORMED JULY 1, 1998 THROUGH JULY 31, 1998
 CONTRACT NO. DTFH70-XX-C-000XX
 ACE CONTRACTING, INC.

ITEM NO.	NAME	CONTRACT QUANTITY	UNIT PRICE	UNIT	AMOUNT	CURRENT QTY.	PREV. QTY.	QTY. TO DATE	CURRENT AMOUNT	AMOUNT TO DATE
15101	Mobilization	1	\$200,000.00	LS	\$200,000.00	0.00	1.00	1.00	\$0.00	\$200,000.00
15201	Constr. Survey and Staking	1	\$51,500.00	LS	\$51,500.00	0.05	0.80	0.85	\$2,575.00	\$43,775.00
15401	Contractor Testing	1	\$35,000.00	LS	\$35,000.00	0.10	0.80	0.90	\$3,500.00	\$31,500.00
15501	Construction Schedule	1	\$2,500.00	LS	\$2,500.00	0.50	0.25	0.75	\$1,250.00	\$1,875.00
15703	Silt Fence	4,100	\$9.30	m	\$38,130.00	500.00	2,000.00	2,500.00	\$4,650.00	\$23,250.00
15708	Straw Bales	340	\$7.50	EA	\$2,550.00	24.00	105.00	129.00	\$180.00	\$967.50
15709	Check Dams	70	\$150.00	EA	\$10,500.00	15.00	10.00	25.00	\$2,250.00	\$3,750.00
20101	Clearing and Grubbing	13	\$5,600.00	ha	\$72,800.00	13.00	0.00	13.00	\$72,800.00	\$72,800.00
20401	Roadway Excavation	108,000	\$3.82	m3	\$412,560.00	29,000.00	46,000.00	75,000.00	\$110,780.00	\$286,500.00
25101	Placed Riprap	350	\$14.50	m3	\$5,075.00	66.00	205.00	271.00	\$957.00	\$3,929.50
30101	Aggregate Base, Grading D Incentive Bonus	33,000	\$9.76	t	\$322,080.00	21,000.00	0.00	21,000.00	\$204,960.00	\$204,960.00
40101	Hot Asph. Concr. Pavement	6,300	\$0.10	t	\$148,302.00	21,000.00	0.00	21,000.00	\$2,100.00	\$2,100.00
60201	1200 mm Pipe Culvert	50	\$23.54	t	\$29,500.00	0.00	0.00	0.00	\$0.00	\$0.00
63509	Flagger	700	\$590.00	m	\$29,500.00	15.00	12.00	27.00	\$8,850.00	\$15,930.00
			\$39.00	HR	\$27,300.00	24.00	0.00	24.00	\$936.00	\$936.00
Contract Modifications										
25102	CM-0001 Keyed Riprap	50	\$45.00	m3	\$2,250.00	30.00	15.00	45.00	\$1,350.00	\$2,025.00
60901	CM-0002 Stone Curb	500	\$150.00	m	\$75,000.00	38.00	186.00	224.00	\$5,700.00	\$33,600.00
Temporary Items										
30101	Materials on Hand Advance	33,000	\$4.20	t	\$138,600.00	(21,000.00)	33,000.00	12,000.00	(\$88,200.00)	\$50,400.00
TOTALS										
						\$334,638.00			\$334,638.00	\$978,298.00

* Note Quantity reflects 10% (\$5,150) being withheld from subcontractor as a condition of subcontract.
 ** Note Incentive bonus reflects 1.02 payfactor, in accordance with Subsection 106.05

CONTRACTOR'S INVOICE

Exhibit 11.5E

11.5.7 Invoice Approval

If the invoice is correct as defined in 11.5.6.1 and in **Section 109 – MEASUREMENT AND PAYMENT** of the contract, process the invoice as follows:

- Overnight mail the invoice and the signed copy of the current Progress Estimate to the Contract Administration Specialist
- Fax or scan/e-mail a copy of the Contractor's invoice to the Contract Administration Specialist
- e-mail the zipped copy of the current progress estimate to the Contract Administration Specialist, and
- File a copy of contractor's invoice and the current progress estimate in your project records.

Once the estimate is paid, the Contract Administration Specialist will send two copies of the paid estimate back to you. One copy is for your project records "Engineer's Copy" and one copy is for the Contractor's project superintendent "Contractor Foreman's Copy". Sign the returned copy marked "Engineer's Copy" and replace the copy of the current Progress Estimate in your project records.

For projects managed by contracted Construction Managers

- Overnight mail the original signed contractor's invoice to the Contract Administration Specialist in Vancouver.
- Scan and e-mail a copy of the contractor's invoice to the Project Manager.
- E-mail a zipped copy of the current progress estimate to the Project Manager, along with a recommendation to approve the estimate.
- If the Project Manager concurs with your recommendation to approve the invoice, the Project Manager will e-mail the estimate to the Contract Administration Specialist for processing.
- File a copy of the progress estimate along with a copy of the contractor's invoice in your estimate book.

11.5.7.1 Adjustments to Contractor's Invoice

Certain additions or adjustments discussed in Section 109 of the Standard Specifications may be made to the Contractor's invoice. These adjustments generally relate to retainage, liquidated damages, or other liabilities to the Government, which are handled outside the normal contract items. Some of these items, such as liquidated damages may be in dispute. It is awkward to ask a Contractor to certify to the correctness of liquidated damages at the same time they are being contested, so they may not appear on the Contractor's invoice, which is fine. It is therefore acceptable for the Government to make such adjustments administratively after the invoice is received. These adjustments do not make the certification invalid.

Any adjustments to the Contractor's invoice which are an adverse action (i.e., retainage, liquidated damages, or other liabilities to the Government) should be documented by written notice to the Contractor explaining the reason for the adjustment, and if temporary, the conditions which would cause the adjustment to be rescinded.

11.5.8 Payment

The Contractor will be paid on the 14th day after the contractor's approved invoice is received by the billing office (Project Office). If the Contractor has any questions regarding the payment date, or hasn't received payment they should, contact the Contract Administration Specialist.

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CHAPTER 12

PROJECT CLOSEOUT

12.1 OVERVIEW

This chapter contains guidelines for project close out. Project closeout is usually performed in the two to three weeks after the project final acceptance review.

12.2 FILE AND BINDER CHECKS

Check all files and binders for completeness of documentation and correctness of documentation. The following guidelines are for some of the different files and/or binders:

12.2.1 Pay Items

The Project Engineer will need to make sure all required support documentation (material certifications, measurement drawings, and/or weight tickets for water trucks, cut sheets, and/or shop drawings for structural elements, etc.) for the item of work are included at the back of the pay item section. If any of this information is missing the Project Engineer will need to get it from the contractor before submitting the project books for final review.

The Project Engineer will need to go through all pay notes and recheck them, to make sure they are complete (Project, date, item number, signatures, etc.) and correct (computations, quantity, etc.). The Project Engineer should physically put a “√” check mark by all correct computations and quantities.

- If correct and complete – Stamp with “*Checked By*” and “*Date*” stamp and sign.
- If incorrect and/or incomplete – Make required corrections to the pay note.
- If the changes made were only for having incomplete information and not computations or quantity, then stamp with “*Checked By*” and “*Date*” stamp and sign.
- If the changes made were in computations or the quantity, put a brief note of the change on the pay note and initial. This note should then be stamped with “*Checked By*” and “*Date*” stamp, and all original work as well as the changes made should be checked by a separate individual if available and signed if correct.
- In either instance above make a copy for the contractor of the corrected paynote and send via mail.

Corrections will also need to be made to the Progress Estimate program. The Project Engineer will have to enter a new quantity into the Daily Production Summary regardless of being positive or negative. Information must be entered into the Notes area of the Daily Production Summary form, be very specific to what the quantity is for and why the change was made. Correction to the original quantity entered into the Progress Estimate program is not possible if it has been posted to the estimate and paid.

Once an entire item has been checked and found to be correct, the Project Engineer will need to print out the Item Production Sheet Report from the Progress Estimate program, and cross check “√” it to the individual pay notes if correct. Stamp with “*Checked By*” and “*Date*” stamp and sign. If not correct the Project Engineer will need to reconcile the problem and redo the entire process if necessary to correct the problem. Place the checked summary in the front of the particular pay item section.

Once all the items have been checked, cross-check their totals with what has been or will be paid to the Contractor.

12.2.2 Progress Estimate

- Zero out progress estimate probables to the extent possible.
- In the “location” column of the Progress Estimate program, show where paynote information resides. E.g. – Book 1-20401; or Book 2-40101 & Book 4-QL-Pay. One entry is sufficient if they are all located in the same location. (When the Progress Estimate Summary Book is printed, these locations are included as part of the printout. Contrary to past procedures, you do not have to number all of the pages for each binder unless it is how you conduct your business. Some folks number pay notes for each pay item to facilitate tracking quantities.
- Print out the Progress Estimate Summary book to use for checking the quantities for contract items. Once checked, stamp and sign each item in the Summary Book. Include any pertinent notes. The project engineer is required do a 100% record check. Ideally, two people will perform and sign that they have checked the records. For QL-Pay items, lots and pay factors should be correlated with paynotes. Subsequent checkers should be able to easily locate and evaluate your documentation. Vancouver will do spot checks.
- Include a progressive running total summary with each bid item. This summary should show all paynotes and for which estimate they were paid. (See attached “Running Total v2” sample). If you use the “Daily Production Form” from the Progress Estimate Program to post estimates, then you will already have a running total of all pay items. (You may need to hand write in which were paid for a particular estimate). This report can be printed using the “Item Production Sheets” Report.

12.2.3 Correspondence

Go through the correspondence books and make sure the index is complete, neat, and legible. Make any necessary updates. There should only be copies of correspondence in these books; all originals were to be sent to the recipient or central files through the COE.

12.2.4 Other Books and Files

Review all other books and files to ensure they are complete.

- **Survey Information** – Have all the surveyor’s note been submitted, which were to be turned in at least weekly?
- **Payrolls** – Are all payrolls submitted, correct, and checked? Stamped with “*Checked By*” and “*Date*” stamp and signed?
- **Testing** – Have all required test results been submitted and checked? Stamped with “*Checked By*” and “*Date*” stamp and signed? Has QL Pay been completed and results e-mailed to the Materials Quality Assurance Engineer?
- **Plans and Reports** – Have all required plans and reports been submitted, checked (Stamped with “*Checked By*” and “*Date*” stamp and signed?), and/or approved (Stamped with “*Approved*” stamp?).
- **Other Miscellaneous Books and Files** – Complete, Correct, Stamped, Checked “√”, and/or Approved?

12.3 AS-BUILT DRAWINGS

The Project Engineer should ensure the As-Built drawings have been submitted and are complete according to the requirements in Chapter 5 of this manual.

12.4 CLOSEOUT CHECKLIST

Complete the project closeout checklist shown below.

Include a completed checklist with your Final Records submittal

Project Name and number: _____

Project Engineer: _____

COE: _____

Contractor: _____

Potential Claim Status (Circle one) No outstanding issues Outstanding issues Claim pending

Describe any outstanding issues

Project Personnel (FHWA):

Substantial Completion Date: _____

Final Inspection Date: _____

Final Completion Date: _____

Database report stuff

Lane km of paved road _____

Lane km of gravel road _____

Number of bridges (new) _____

Number of bridges (rehab) _____

Improvements (circle) 3R 4R New Gravel

12.5 PREPARE PROJECT RECORDS FOR SHIPMENT

Once all books and files have been checked, box all records and prepare needed paperwork per the closeout checklist. Deliver or ship these files to the Contract Administration Specialist as directed by the COE for final review.

Complete a transmittal letter, or a form similar to that shown in Exhibit 12.5A, when transferring records to the Contract Administration Specialist. This will ensure a proper accounting of the records during the final review and transmittal to central files.

12.5.1 Mailing instructions

- Use uniform size boxes for project records
- Label the front and back of each box with the project number/project name/contract number and Box X of XX (see attached label master)
- Put books in order sequentially in boxes. Generally put the spines down, so the contents don't spill out when subsequently being removed.
- Don't overload binders! Add extra binders as needed.
- If a large binder only has a couple of sheets of paper in it, consider combining the contents with another binder or using a smaller binder.
- Insure that tab labels are secure
- Prepare an SF10-110 and place copy in each box. (use attached Word or Excel template) (The "Central files #" section will be filled out in Central files after the books have been checked and delivered to them.) **Put one book/folder per line, and title the Book/folder.**
- SF10-110 - Email to Contract Administration Specialist
- Project CD – provide a CD containing project computer files. At a minimum, include all project photos and QL-Pay data files. Also include other easily accessible files such as correspondence, item summaries, etc. If significant negotiations or a claim is anticipated provide as many electronic files as possible. These computer files will help Claims folks locate pertinent information.
- Project Quality Award CD – Provide a second CD with approximately 30 photos that provide a snapshot of your project (some before, during, & final, as well as the project staff). These photos will likely be used during the project awards presentation. Also include a list of the project personnel along with their names, as they would like them to be shown with the project introduction slide.
- Send in As-Constructed plans on field size plans (for other requirements see Construction Manual section 2-14). Roll up the As-built plans and label on the outside.
- Fold bridge drawings, shop drawings, and large Construction Schedules and place them in labeled expandable folders. If they are already in binders, leave them there.
- Do send in the PE hold file with your project records. Though redundant, also send in things previously sent to central files such as correspondence, QL-Pay results, and contract modifications.

TRANSMITTAL LETTER

**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
Western Federal Lands Highway Division**

Date: _____
File: Construction
State: _____
Route: _____
Project: _____

To: Margaret Moen (Final Review)

From: _____

We are transmitting to you:

_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____
_____	Book	_____

Please acknowledge receipt by signing, dating and returning one copy of this letter enclosed with the notes.

Received by _____

Date _____

Records delivered by: (Project Engineer)

EXAMPLE TRANSMITTAL FORM

Exhibit 12.5A

12.6 GOVERNMENT FURNISHED MATERIALS

For projects managed by contracted Construction Managers

Return all Government supplied items (manuals, stamps, and equipment etc.) to the Project Manager.