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Instructions:

Page numbers and corresponding sheet-counts are given in the table below to indicate portions of the *Construction Manual* that are to be removed and inserted to accomplish this revision.

Chapter	Remove		Insert	
	Pages	Sheets	Pages	Sheets
Title Page	N/A	1	N/A	1
Foreword and Contents	i – iv	2	iii – vi	2
Chapter 1 Contents	i – iv	2	i – iv	2
Chapter 1 Administration	1-1 – 1-76	38	1-1 – 1-82	41
Chapter 2 Earthwork	2-11 – 2-14	2	2-11 – 2-14	2
Chapter 5 Surface Treatments and Pavements	5-17 – 5-18	1	5-17 – 5-18	1
Chapter 6 Contents	i – iv	2	i – ii	1
Chapter 6 Structures	6-1 – 6-46	23	6-1 – 6-40	20
Chapter 8 Contents	i-ii	1	i-ii	1
Chapter 8 Miscellaneous Construction	8-3 – 8-4	1	8-3 – 8-4	1
	8-17 – 8-18	1	8-17 – 8-18	1
	8-23 – 8-26	2	8-23 – 8-24	1
Chapter 9 Contents	i-iv	2	i-iv	2
Chapter 9 Materials	9-1 – 9-48	24	9-1 – 9-48	24
Chapter 10 Contents	i-ii	1	i-ii	1
Chapter 10 Documentation	10-1 – 10-22	11	10-1 – 10-22	11
Chapter 11 Contents	N/A	1	i – ii	1
Chapter 11 Forms	11-1 – 11-6	3	11-1 – 11-6	3
Index	i-vi	3	i – iv	2

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Construction Manual

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July 2007



**Washington State
Department of Transportation**

Construction Office



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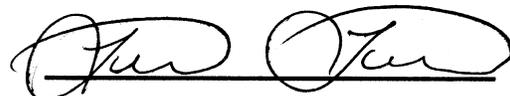
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This manual is provided for our construction engineering personnel as instruction for fulfilling the objectives, procedures, and methods for construction administration of Washington State transportation projects. This manual contains two kinds of instructions depending on the subject matter and the nature of the work. In one case, where the activity is the inspection of contract work that is critical from a structural or operational viewpoint, the instructions prescribe detailed methods and procedures designed to assure the objective of a safe and adequate finished product. In other cases, typically in the areas of documentation and payment, the instructions are limited to describing the necessary objectives of the work without specifying the methods or procedures. The *Construction Manual* is intended as a reference book that is consistent with the language and intent of the *Standard Specifications*. In order to use this reference effectively, it is essential that the user has a thorough understanding of the contract, contract plans, contract provisions, and *the Standard Specifications*, as well as this manual.

Where specific methods and procedures are not included, the intent of the manual is to provide the project staff with a statement of the outcomes required and to allow the Region Construction Management and the Project Engineer to devise procedures accordingly. The manual provides basic instruction for identifying policies or laws that affect the construction administration work, however, the manual generally does not interpret these policies or laws. Compliance with policies, laws, and regulations is the duty of the Project Engineer, who may call on others, especially those authorized to enforce laws and regulations, at any time for assistance. In order to respond to the many situations that may arise on different contracts with different types of work, the instruction provided by this manual is general in character and is not to be construed as replacing, modifying, or superseding any of the provisions of the contract, contract plans, contract provisions, or *Standard Specifications*.

The tone of this manual is noticeably different from previous editions in that it affirms the philosophy of decision making at the appropriate levels. With that decision-making authority comes responsibility to make good decisions. Decisions to deviate from the instruction provided in this manual must be based on engineering judgment, and supportable as representing the best interests of the public.

Comments about the manual are always welcome and will be considered in future updates.



Linea Laird, P.E.
State Construction Engineer

Metrication

Throughout this manual, English units are used as the primary unit with Metric (SI) units following in parentheses. Metric conversion of English units is generally in accordance with ASTM E 380 and AASHTO guidelines. In some cases, metric conversion has been rounded to a practical value rather than a precise conversion.

Chapter 1	Administration
Chapter 2	Earthwork
Chapter 3	Production From Quarry and Pit Sites and Stockpiling
Chapter 4	Bases
Chapter 5	Surface Treatments and Pavements
Chapter 6	Structures
Chapter 7	Drainage Structures, Storm Sewers, and Conduits
Chapter 8	Miscellaneous Construction
Chapter 9	Materials
Chapter 10	Documentation
Chapter 11	Forms
Index	

1-1	General Information	1-1
1-1.1	Purpose and Scope of Manual	1-1
1-1.2	Definition of Terms	1-1
1-1.3	WSDOT State Construction Office	1-1
1-1.3A	State Construction Engineer	1-1
1-1.3A(1)	Administration	1-1
1-1.3A(2)	Roadway	1-2
1-1.3A(3)	Bridges	1-2
1-1.4	Materials	1-2
1-1.5	Region Organization	1-2
1-1.5A	Regional Administrator	1-2
1-1.5B	Regional Construction Manager	1-2
1-1.6	Relationship With Other Agencies	1-2
1-1.6A	Federal Highway Administration	1-2
1-1.6B	Local Agencies	1-2
1-1.6B(1)	Project Engineer Administering Local Agency Project	1-4
1-1.6B(2)	Local Agency Administering Its Project on State Right of Way	1-4
1-1.6C	Other Federal, State, and Local Agencies	1-4
1-1.6C(1)	Highways over National Forest Lands	1-4
1-1.7	Relating to the Public	1-4
1-1.8	Safety	1-4
1-1.9	Archaeological and Historical Objects	1-5
1-1.10	Construction Work in International Boundary Strip	1-5
1-2	Contract Administration	1-5
1-2.1	Proposal and Award of Contract	1-5
1-2.1A	Contract Proposal and Bids	1-5
1-2.1B	Award and Execution of Contract	1-6
1-2.1C	Preconstruction Meetings, Discussions	1-6
1-2.2	Project Engineer's Relationship and Responsibilities	1-10
1-2.2A	Assignment	1-10
1-2.2B	Responsibility as a Public Official	1-11
1-2.2C	Relationship With the Contractor	1-11
1-2.2D	Relationship With Other Government Agencies	1-11
1-2.2E	Relationship With Public and Private Utilities	1-12
1-2.2F	Responsibility for Coordination of Railroad Agreements	1-12
1-2.2G	Responsibility for Railroad Encroachment Insurance	1-12
1-2.2H	Responsibility for Coordinating Work With Other Contracts	1-14
1-2.2I	Responsibility for Enforcement of Safety and Health Requirements	1-14
1-2.2I(1)	General	1-14
1-2.2I(2)	Precontract Preparation	1-14
1-2.2I(3)	Preconstruction Duties	1-14
1-2.2I(4)	The P.E.'s Role in Safety on the Project	1-14
1-2.2I(5)	Pedestrian Safety	1-15
1-2.2J	Responsibility for Environmental Considerations	1-15
1-2.2J(1)	Spill Prevention, Control, and Countermeasures (SPCC) Plans	1-16
1-2.2K	Responsibility for Environmental Compliance During Construction	1-16
1-2.2K(1)	Environmental Compliance Assurance Procedure	1-16
1-2.2L	Responsibility for Posting Required FHWA and State Labor and Industries Job Site Posters	1-18

1-2.2M	Responsibilities When Working on Tribal Lands	1-18
1-2.2N	Responsibilities Following Unanticipated Discovery of Cultural Resources	1-18
	1-2.2N(1) Discovery of Human Skeletal Remains	1-18
	1-2.2N(2) Discovery of Other Cultural Resources	1-19
1-2.3	Construction Traffic Control	1-19
1-2.3A	Public Convenience and Safety	1-19
	1-2.3A(1) General	1-19
	1-2.3A(2) Work Zone Clear Zone (WZCZ)	1-19
	1-2.3A(3) Temporary Breaks in Limited Access for Construction	1-20
1-2.3B	Public Information and Customer Focus	1-20
1-2.3C	Work Zone Traffic Control	1-21
	1-2.3C(1) General	1-21
	1-2.3C(2) Traffic Control Management	1-22
	1-2.3C(3) Traffic Control Labor, Procedures and Devices	1-23
	1-2.3C(4) Measurement	1-25
	1-2.3C(5) Payment	1-26
	1-2.3C(6) Construction and Maintenance of Detours	1-26
	1-2.3C(7) Road/Ramp Closures	1-26
1-2.3D	Speed Reductions	1-27
1-2.3E	Records of Construction Signing, Collisions, and Surveillance	1-27
1-2.3F	Resources for Traffic Control and Work Zone Safety	1-27
1-2.4	Application of Contract Provisions, Plans, and Specifications	1-28
1-2.4A	Construction Contracts Information System (CCIS)	1-28
1-2.4B	Order Lists	1-29
1-2.4C	Changes in the Work	1-29
	1-2.4C(1) Types of Changes	1-29
	1-2.4C(2) Equitable Adjustment	1-34
	1-2.4C(3) Approval of Changes/Checklist	1-36
	1-2.4C(4) Delegation of Execution Authority	1-38
	1-2.4C(5) Verbal Approval	1-38
	1-2.4C(6) Documentation	1-38
	1-2.4C(7) Minor Changes	1-40
1-2.4D	Force Account	1-41
	1-2.4D(1) General	1-41
	1-2.4D(2) Payment Procedures for Force Account Work	1-42
	1-2.4D(3) Records and Source Documents	1-45
	1-2.4D(4) Summary	1-45
1-2.4E	Differing Site Conditions (Changed Conditions)	1-45
1-2.4F	Termination of Contract	1-46
1-2.4G	Subletting Portions of the Contract	1-46
1-2.4H	Contractors' Shop Plans and Working Drawings	1-46
1-2.4I	Relief of Responsibility for Completed Work and Relief of Responsibility for Damage by Public Traffic	1-47
1-2.4J	Protested Work	1-47
1-2.4K	Metric Designed Projects Administered with English <i>Standard Specifications</i>	1-47
1-2.5	Contract Time	1-48
1-2.5A	General	1-48
	1-2.5A(1) Progress Schedules	1-48
	1-2.5A(1) Review and Approval of Progress Schedules	1-49
1-2.5B	Working Day Charges	1-54
1-2.5C	Suspension of Work	1-54
1-2.5D	Extension of Time	1-55
1-2.5E	Substantial Completion	1-55
1-2.5F	Date of Physical Completion	1-56

1-2.5G	Liquidated Damages	1-56
1-2.5G(1)	Contract Time Liquidated Damages	1-56
1-2.5G(2)	Miscellaneous Liquidated Damages	1-57
1-2.5H	Completion Date	1-57
1-2.6	Enforcement of Wage Rate Requirements	1-57
1-2.6A	General Instructions	1-57
1-2.6B	Monitoring of State Requirements	1-57
1-2.6C	Enforcement of Federal Prevailing Wage Provisions	1-58
1-2.6C(1)	Federal Prevailing Wage Rates	1-59
1-2.6C(2)	Certified Payroll Inspection	1-59
1-2.6C(3)	Employee Interviews	1-59
1-2.6C(4)	Complaints	1-60
1-2.6C(5)	Federal Prevailing Wage Violations	1-60
1-2.6C(6)	Department of Labor Investigation	1-60
1-2.6C(7)	Fraud Notice Poster	1-60
1-2.6C(8)	Request For Authorization of Additional Classification and Rate	1-60
1-2.7	EEO, D/M/WBE and Training	1-61
1-2.7A	Overview	1-61
1-2.7B	EEO (Federally Funded Projects)	1-61
1-2.7B(1)	Prompt Return of Retainage to All Subcontractors	1-61
1-2.7C	EEO (State Funded Projects)	1-62
1-2.7D	EEO (Federally Assisted Projects)	1-62
1-2.7E	Minority and Women Owned Business Enterprise (MBE, WBE)	1-62
1-2.7F	Disadvantaged Business Enterprise (DBE)	1-63
1-2.7F(1)	GSP Includes No Goal	1-63
1-2.7F(2)	GSP Includes Condition of Award (COA) Goal	1-63
1-2.7F(3)	Additional Execution Documents	1-63
1-2.7F(4)	DBE Reporting	1-63
1-2.7F(5)	On Site Reviews	1-64
1-2.7F(6)	Changes to the Condition of Award (COA)	1-64
1-2.7F(7)	Substitution	1-64
1-2.7F(8)	Condition of Award (COA) Change Orders	1-64
1-2.7F(9)	Consulting with the Office of Equal Opportunity	1-65
1-2.7G	On-the-Job Training (OJT)	1-65
1-2.7G(1)	On-the-Job Training Special Provisions — General	1-65
1-2.7G(2)	OJT Required Reports	1-65
1-2.7G(3)	Payment for “Training”	1-66
1-2.7H	Apprentice Participation	1-66
1-2.7H(1)	Apprentice Participation Special Provision – General	1-66
1-2.7H(2)	Apprentice Utilization Plan	1-66
1-2.7H(3)	Reporting	1-66
1-2.7H(4)	“Good Faith” Procedures	1-66
1-2.8	Control of Work	1-67
1-2.8A	Authority of the Project Engineer	1-67
1-2.8B	Contractor’s Equipment, Personnel, and Operations	1-67
1-2.8C	Defective or Unauthorized Materials or Work	1-68
1-2.8C(1)	Defective Materials	1-68
1-2.8C(2)	Defective or Unauthorized Work	1-68
1-2.8C(3)	Material Acceptance by Manufacturer’s Certificate	1-69
1-2.8D	Contractor Submittals	1-69
1-2.8E	Guarantees/Warranties	1-69
1-2.8F	Contractor’s Performance Reports	1-70

1-3	Estimates and Records	1-70
1-3.1	Estimates	1-70
1-3.1A	General	1-70
1-3.1B	Progress Estimates	1-70
1-3.1B(1)	Payment for Material on Hand	1-71
1-3.1B(2)	Payment for Falsework	1-71
1-3.1B(3)	Payment for Shoring or Extra Excavation	1-71
1-3.1B(4)	Payment for Asphalt and Fuel Cost Adjustment	1-71
1-3.1B(5)	Payment for Surplus Processed Material	1-72
1-3.1B(6)	Liquidated Damages	1-72
1-3.1B(7)	Credits	1-72
1-3.1B(8)	Railroad Flagging	1-73
1-3.1B(9)	Payment for Third Party Damages	1-73
1-3.1B(10)	Withholding of Payments	1-73
1-3.1C	Final Estimates — Regions	1-74
1-3.1D	Final Estimates — Headquarters	1-75
1-3.1D(1)	Final Estimate Claim Reservations	1-75
1-3.1D(2)	Unilateral Acceptance of Final Estimates	1-75
1-3.1E	Supplemental Final Estimates	1-75
1-3.1F	Retained Percentage	1-76
1-3.2	Final Records for Projects Constructed by Contract	1-76
1-3.3	Disputes and Claims	1-76
1-3.3A	Claims By the Contractor	1-76
1-3.3A(1)	Disagreement, Dispute, Protest	1-76
1-3.3A(2)	Claims	1-77
1-3.3A(3)	Legal Filing	1-77
1-3.3A(4)	Final Contract Voucher Certification	1-77
1-3.3B	Claims Against the Contractor — Damage	1-77
1-3.3C	Claims Against the Contractor — Money	1-78
1-3.3D	Claims Against Officials and Employees	1-78
1-3.4	Stewardship	1-78
1-4	Utility and Railroad Relocation	1-80
1-4.1	Work Performed Under Utility Agreements	1-80
1-4.2	Work Performed Under Railroad Agreements	1-80
1-5	Surveying	1-81
1-5.1	Site Surveying	1-81
1-5.1A	Permanent Monuments	1-81
1-5.1B	Property Corner Monuments and Markers	1-81
1-5.1C	Alignment Monumentation	1-81
1-5.2	Construction Surveying	1-81
1-5.2A	Surveying Provided by the State	1-81
1-5.2B	Contractor Surveying	1-82
1-5.2C	Grade Control	1-82
1-5.2C(1)	Subgrade Tolerance	1-82
1-5.2C(2)	Surfacing Tolerance	1-82
1-6	Inspection of Course Thicknesses	1-82

1-1 General Information

1-1.1 Purpose and Scope of Manual

This manual is published by the State Construction Office primarily as a resource for construction engineering personnel. It is intended as instruction for administering Washington State transportation projects. The manual recognizes established standards and describes accepted engineering practices. The instruction provided by this manual is intended to identify desired results, establish standardized requirements, and provide statewide uniformity in the administration and construction of transportation related contracts.

Construction engineering staff responsible for work on construction contracts will want to be familiar with the guidance and instructions included in this manual. The guidance presented by this manual is intended to complement the requirements of the *Standard Specifications* and the contract provisions and to promote uniformity of results among all Regions of the Washington State Department of Transportation (WSDOT).

Suggestions for corrections, additions, or improvements to this manual, and to the *Standard Specifications or General Special Provisions* are welcomed and encouraged. Any means of communication with the Construction Office will be accepted and reviewed promptly.

1-1.2 Definition of Terms

In using this manual, the interpretation of words or terms should be considered the same as set forth under "Definitions and Terms" in Section 1-01 of the *Standard Specifications*. If a conflict should occur between the guidance or instructions offered by this manual and the specifications or provisions identified in the contract, the latter should always prevail.

1-1.3 WSDOT State Construction Office

The State Construction Office strives for consistent, cost-effective, quality construction through direct support of WSDOT's Regional construction program. The Construction Office coordinates the development of policies and standards, provides training, guidance, oversight, technical expertise and advocacy, introduces innovation, and coordinates and shares information on construction issues.

1-1.3A State Construction Engineer

The State Construction Engineer reports to the Director of Environmental and Engineering Programs and is assigned the responsibility for all WSDOT contract construction projects, except those contracts executed by the Director of Washington State Ferries Division. The State Construction Engineer is responsible for all matters pertaining to contract administration and represents the Director in managing the performance of these contracts. In addition, the State Construction Engineer acts for the Director in approving increases or decreases of work, changes in the work, changes in materials incorporated into the work, authority to accomplish work by force account, extensions of time, and the assessment of any liquidated damages. The State

Construction Engineer is responsible for providing guidance and direction to the Regions and State Construction Office personnel who are investigating construction claims and is responsible for the approval of all claim settlements. The State Construction Engineer establishes WSDOT policy relative to inspection and documentation and ensures uniform interpretation and enforcement of the *Standard Specifications* and contract provisions throughout the State. The State Construction Engineer is assisted by three principal assistants for construction as outlined in the Table of Organization shown in Figure 1-1.

1-1.3A(1) Administration

The Construction Engineer, Administration, acts for the State Construction Engineer in setting requirements for contracting, policy, and responding to questions from the regions on all issues pertaining to Division 1 of the *Standard Specifications* and Chapters 1 and 10 of the *Construction Manual*. These include, but are not limited to, time extensions, external civil rights contract changes, prevailing wage issues, documentation, and claims resolution. The Construction Engineer, Administration, also represents WSDOT on task forces with contractor organizations, other public agencies, and at the legislature regarding public contracting issues.

The Construction Engineer, Administration, is assisted by:

- The *Assistant Construction Engineer, Administration*, who reviews time extensions and liquidated damage assessments, and represents the Construction Office on external civil rights issues. The Assistant Construction Engineer for Administration also acts as liaison to various external stakeholders and suppliers.
- The *Documentation Engineer*, who provides guidance for contract documentation and contract payments, as well as providing support to Region Documentation Engineers. The Documentation Engineer resolves issues of material documentation deficiencies for all federal aid projects, is responsible for prevailing wage issues, and is also responsible for evaluating the contract for Acceptance.
- The *Specification Engineer*, who is responsible for maintaining the *Standard Specifications*, and General Special Provisions, and provides guidance and review in the writing of Special Provisions.
- The Construction Administration Specialist, who is responsible for the Construction Manual. The Construction Administration Specialist also supports the Assistant Construction Engineer, Administration in matters concerning goal setting.
- The *Construction Administration Support Engineer*, who is the CCIS System Manager, the Construction Office Liaison to MIS, supports the Region and Project Engineer offices by providing training in the use of CCIS and the CCIS Sequel Database. This position also maintains the Construction Office intranet web page and the *Equipment Rental Rate Blue Book*.

1-1.3A(2) Roadway

The Construction Engineer, Roadway, acts for the State Construction Engineer in matters of highway construction such as grading, drainage, surfacing, paving, signing, guard rails, illumination, traffic signals, landscaping, rest areas, and other projects as assigned.

For the purpose of establishing uniformity between the Regions, the Construction Engineer, Roadway, is responsible for establishing accepted practices for construction, construction engineering, and contract administration for work performed within these fields. Some of these responsibilities include inspecting projects, evaluating reasons for contract changes, approving change orders, conducting or assisting in contract negotiations, investigating complaints and claims, and providing recommendations on major changes to the State Construction Engineer.

The Construction Engineer, Roadway, is assisted by three professional engineers.

1-1.3A(3) Bridges

The Construction Engineer, Bridges, acts for the State Construction Engineer in matters for bridges and related structural construction, and other projects as assigned. For the purpose of establishing uniformity between the Regions, the Construction Engineer, Bridges, is responsible for establishing accepted practices for construction, construction engineering, and contract administration of work performed in construction of bridges and other related structural construction. Some of these responsibilities include inspecting projects, evaluating reasons for contract changes, approving change orders, conducting or assisting in contract negotiations, acting as a resource to the Regions for resolving construction related problems, investigating complaints and claims, and providing recommendations on major changes to the State Construction Engineer.

The Construction Engineer, Bridges, is assisted by two professional engineers.

1-1.4 Materials

The Materials Engineer acts for the Director of Environmental and Engineering Programs by directing the materials testing, inspecting, and acceptance functions of WSDOT. Subject to the approval of the Director of Environmental and Engineering Programs, the Materials Engineer; formulates and recommends policies and procedures; directs operating methods to be followed in providing precontract soils, foundation, and materials analysis and testing; recommends and/or approves Pavement Designs; furnishes counsel and technical assistance to the Regional Construction Manager in conducting required materials tests and analysis and provides for periodic review of these test methods and procedures to ensure their conformance to established policies, procedures, and methods; and provides a program that verifies the uniformity of all testing and sampling procedures.

The Materials Engineer is assisted by a staff of professional engineers, administrative personnel, engineers, and technicians.

1-1.5 Region Organization

1-1.5A Regional Administrator

The Regional Administrator represents the Secretary in a geographic area, organizes and supervises a staff of personnel which perform administrative duties and supervise location, design, construction administration, and maintenance of the transportation system within the Region. For the purposes of this manual, the Administrator of the Urban Corridors Office is considered to be a Regional Administrator.

1-1.5B Regional Construction Manager

In supervision of construction, the Regional Administrator is assisted by a Regional Construction Manager. The Regional Construction Manager assigns Project Engineers with appropriate supporting personnel and provides training and guidance to the Project Engineers. It is the responsibility of the Regional Construction Manager to ensure that sufficient personnel are provided on all projects at all times to ensure adequate inspection, documentation, and quality controls. For the purposes of this manual, the Deputy Administrator of the Urban Corridors Office is considered to be a Regional Construction Manager.

1-1.6 Relationship With Other Agencies

1-1.6A Federal Highway Administration

The Federal Government provides transportation funding to Washington State through the Federal Highway Administration (FHWA), a division of the United States Department of Transportation. These funds are subject to applicable Federal law, Executive Orders, regulations, and agreements.

The WSDOT contact with FHWA for Construction Administration matters is the State Construction Office. In preparing and approving *Standard Specifications*, general special provisions, and this manual, the Construction Office seeks the review and approval of FHWA. Use of approved provisions and meeting the required outcomes described in the manual become the basis of federal reimbursement.

FHWA provides oversight of WSDOT work on some projects and has delegated that responsibility to WSDOT on others. A full discussion of WSDOT responsibilities under Stewardship is included in this Manual (Section 1-3.4).

1-1.6B Local Agencies

Cities, counties, and other municipalities within the state may also perform work funded with Federal dollars. When this happens, the money is passed through the Department of Transportation and we will have entered into agreements with the local agencies to provide services. For example, WSDOT will allow the use of testing facilities by a local agency.

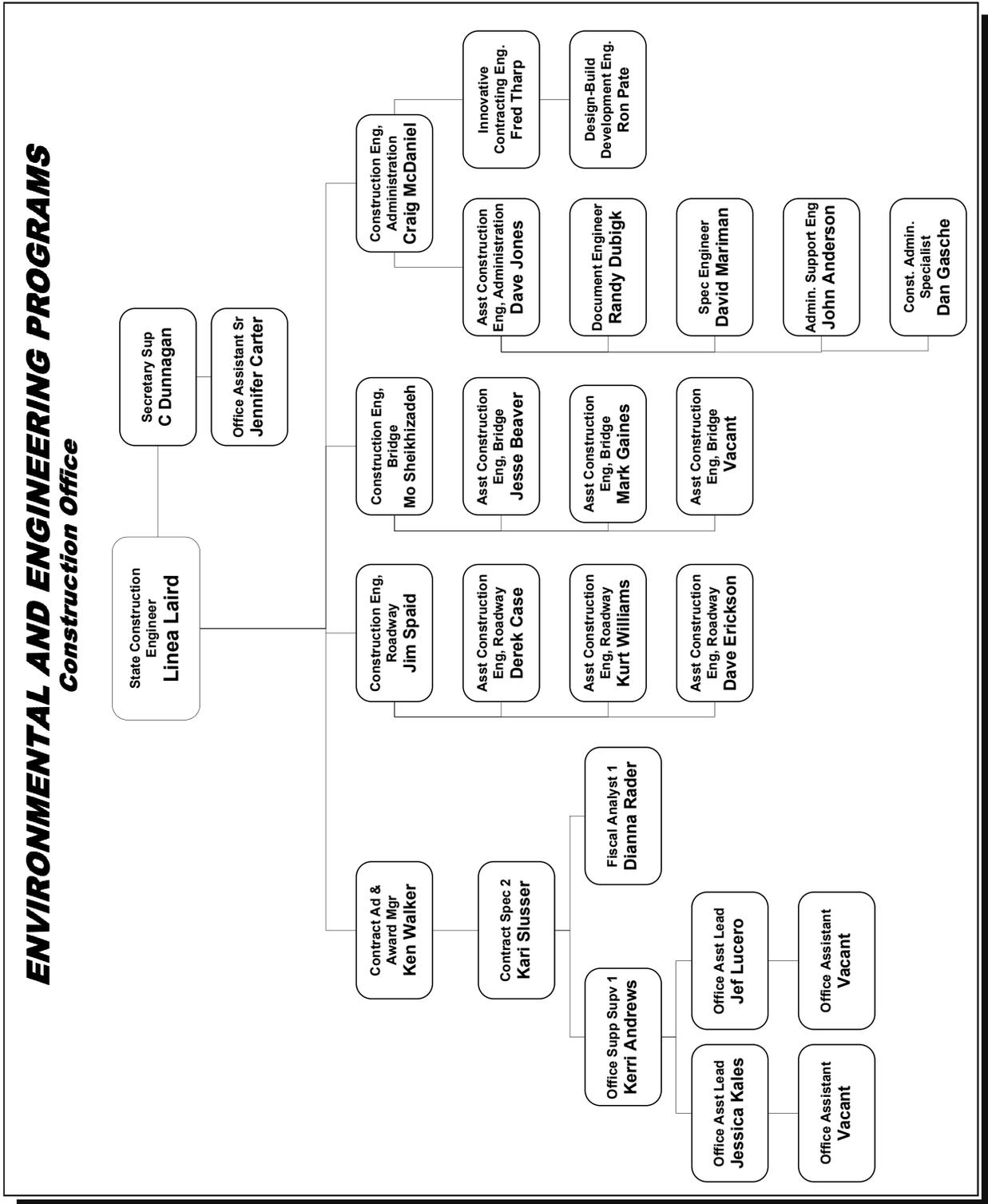


Figure 1-1

1-1.6B(1) Project Engineer Administering Local Agency Project

Occasionally, a WSDOT Project Engineer may be assigned to provide engineering and inspection services on a local agency project. The duties of the Project Engineer will be determined by the actual contract provisions and by any specific agreement made between the Region administration and the local agency. The provisions of this manual may or may not apply, depending on the situation.

1-1.6B(2) Local Agency Administering Its Project on State Right of Way

In some cases, WSDOT may grant approval for a local agency to construct a facility on State Right of Way using local agency staff and contractors. (For example, a city funded overpass of an interstate). When this happens, a Project Engineer will be assigned to provide oversight of the local agency work. The Project Engineer is expected to assure that the local agency provides the same level of engineering and inspection that State employees would accomplish. While the Local Agency may have different administrative provisions with respect to risk-sharing and submittal requirements, all of the technical aspects of the *Standard Specifications* and this manual must be met.

1-1.6C Other Federal, State, and Local Agencies

The design and construction of transportation improvements often incorporates locations and features that fall within the jurisdiction of other agencies. It is the policy of WSDOT to cooperate with all agencies as partners in the completion of each project, recognizing and complying with each agency's legal requirements. The Project Engineer shall cooperate with local authorities to help ensure that the contractor complies with local laws, ordinances, and regulations. However, unless specifically allowed in the statutes and the contract documents, no WSDOT employee shall engage in any kind of enforcement of laws, rules, regulations, or ordinances which are the responsibility of other agencies. As WSDOT attempts to earn confidence and build trust with resource agencies and the public, it is critical that we take the proper actions when we are aware of an issue. When WSDOT employees observe something which is questionable or appears to not be in compliance with local laws, ordinances, and regulations, it shall be brought to the Project Engineer's attention. The Project Engineer is responsible for bringing it to the Contractor's attention for proper action. Rely on the Regional and Headquarters expertise and the appropriate agencies when dealing with complex issues such as environmental compliance, safety, or hazardous materials.

1-1.6C(1) Highways over National Forest Lands

WSDOT has entered into a Memorandum of Understanding (MOU) with the United States Forest Service (USFS) and the Project Engineer is required to do the following when performing work on National Forest Service Lands:

1. Represent the department in all matters pertaining to the project.

2. Confirm that the USFS has been notified of the project advertisement and award.
3. Notify and obtain approval from the USFS for any changes in the project that will affect National Forest System Lands, beyond that of the original contract.
4. Notify the USFS when the project nears completion, at which time the USFS will indicate if they choose to participate in the final review of the project.

1-1.7 Relating to the Public

Public confidence is enhanced by WSDOT personnel being responsive to reasonable requests for information, providing timely advanced notice of possible impacts, and reducing inconvenience to traffic while maintaining worker safety. When possible, the Project Engineer should rely on resources such as Regional Public Information Officers and the State Office of Communications and Public Involvement. If there is concern or reason to question the confidentiality or sensitivity of the information requested, consult with your supervisor or seek the advice of the Attorney General's office.

1-1.8 Safety

Safety is not optional in WSDOT. No employee will be permitted to disregard applicable safety and health standards of the State Department of Labor and Industries or other regulatory agencies.

Since WSDOT employees on transportation construction projects are routinely exposed to a variety of hazards, they must take adequate safety precautions at all times. The following items are emphasized as they represent common activities that workers or work crews may encounter.

- The employee shall ensure that an area is safe before entering it for the purpose of inspection. For example, a deep trench must be adequately shored and braced before entering it.
- Aggregate production and material processing plants should be inspected for safety hazards. Corrective measures should be called to the attention of the Contractor or producer. Corrections must be completed before WSDOT personnel will be permitted to proceed with entry or work upon the premises.
- The employee must at all times watch for backing trucks and not depend upon hearing alone for warning. The noise of plants and other equipment often make it impossible to hear trucks approaching and the truck driver's vision area is restricted when backing a truck.
- Parking WSDOT vehicles too close to the path of construction equipment, behind standing equipment, or in other hazardous locations is not permitted.
- Where traffic is maintained in work zones, care must be taken to avoid approaching traffic when it is necessary for inspectors and others to step onto or cross the traveled portion of the roadway. Whenever possible, work activities, ingress and egress, should be conducted within the relative safety of the work zone.

- WSDOT employees working on foot in the highway right of way and other areas exposed to vehicular traffic must comply with the same high visibility clothing requirements imposed on the contractor by Section 1-07.8 of the *Standard Specifications*.
- Where the engineering crew is working adjacent to traffic, without positive barriers, the work area should be marked with proper signs and traffic control devices as shown on the appropriate Traffic Control Plan (TCP). The crew may be protected by a certified flagger or spotter as needed.
- When the engineering crew is working under the protection of the Contractor's flaggers and signs, other signs may not be needed, but a "STOP"/"SLOW" paddle should be available for use in special situations. Good communication with the Contractor and Flagger is needed to ensure that they are aware of crew activities within the work zone.
- A survey crew is typically exposed to traffic hazards and should conduct survey work under approved TCPs from the *Work Zone Traffic Control Guidelines for Survey Operations* booklet or the Traffic Control Guidelines book. The Region Traffic Office will assist survey crews with TCPs for situations not covered in these publications.
- During blasting operations, employees are instructed to seek cover at least 500 feet from the location of the blasting.

In addition to the above requirements for workers and work crews, supervisors also have the following responsibilities:

- Each supervisory employee is charged with the responsibility of providing safety leadership at all times and safety enforcement when necessary.
- Supervisors shall give thorough instructions to employees under their jurisdiction on the safe use of tools, materials, and equipment and the safe prosecution of work on construction projects.
- The Washington Industrial Safety and Health Act requires that every foreman, supervisor, or other person in charge of a crew have a valid first aid card.
- When employees are injured on the job to the extent that the services of a doctor are required, the Regional Safety Officer shall be notified immediately.
- When traffic control measures are necessary, approved Traffic Control Plans (TCPs) should be used in conformance with the *Manual on Uniform Traffic Control Devices*, as adopted by WSDOT. Supervisors should ensure that the appropriate TCP is used and that the necessary signs, devices and equipment is available.

1-1.9 Archaeological and Historical Objects

It is both National and State policy to preserve historical or prehistorical objects and ruins. These objects and ruins may include sites, buildings, artifacts, fossils, or other objects of antiquity that may have particular significance from a historical, cultural, or scientific standpoint.

If there is a known probability of encountering historical objects, the contract will have included provisions for archaeological and historical salvage. If this provision is included in the project, the Project Engineer should inform the Region Environmental section when clearing and grubbing operations are to begin so arrangements can be made with the Eastern Washington University representatives to either be on site during clearing and grubbing or on call if objects are discovered.

If provisions for archaeological and historical salvage have not been made in the contract and it appears that significant historic or prehistoric objects or ruins have been or are about to be encountered, the Project Engineer should immediately take steps to preserve and protect the objects or ruins. Once the objects or ruins have been sufficiently protected, the Project Engineer should immediately notify the Region Construction Manager, who will provide any necessary initial assistance to the Project Engineer. Where the Region determines appropriate, the Project Engineer will contact and inform through existing Region contracts and Region affiliations, Eastern Washington University, the State Historic Preservation Officer (SHPO), and FHWA of the discovery. The Project Engineer will also help facilitate any on-site meetings for the appropriate parties should either FHWA, SHPO, or Eastern Washington University believe it necessary. If it is determined that the Region will conduct a meeting of the appropriate parties, the actions detailed in the Memorandum of Understanding between FHWA and the Heritage Conservation and Recreation Service (HCRS) should be taken.

1-1.10 Construction Work in International Boundary Strip

The International Boundary Commission of Washington, D.C., by treaty with Canada, has the exclusive jurisdiction of the 20-foot boundary strip, 10 feet on each side of the International Boundary. Any construction work within this strip must be with the exclusive permission of the International Boundary Commission (IBC). Boundary monuments are not to be moved or disturbed in any manner without the expressed approval of the IBC. It is expected that permission for all work within the boundary strip will be obtained from the IBC during the design stage of a project. However, it is the Project Engineer's responsibility to ascertain that permission has, in fact, been obtained from the IBC for all work performed within the boundary strip. The Region shall be immediately notified if, upon construction, it is found that permission has not been obtained to relocate boundary markers or perform construction work in the 20 foot boundary strip.

1-2 Contract Administration

1-2.1 Proposal and Award of Contract

1-2.1A Contract Proposal and Bids

When the design phase of a project is completed and funding has been secured, the public is then notified that WSDOT is ready to accept bids for completion of the work involved. This notice is accomplished by publishing an advertisement for the project, along with an invitation to bid the work,

in the “*Daily Journal of Commerce*”. The advertisement includes a specific date and time for the opening of bids along with the necessary information for obtaining plans, specifications, and bid documents. Once advertised, these plans and specifications are then made available to all contractors who wish to study the project. Contract proposal forms or bid documents are also furnished, but only to those prospective contractors who have been prequalified to bid on the types and quantities of work involved. Once bids have been opened, an announcement in the “*Daily Journal of Commerce*” will also be made identifying the “Apparent Low Bidder”. Specific information regarding the advertisement phase and bidding procedures can be found in the *Ad & Award Manual*, M 27-02

If the Project Engineer determines that prospective bidders may have difficulty locating the project or determining the project limits, the Project Engineer may choose to post the project limits. If this is determined necessary, signs similar to those illustrated in Figure 1-3 should be used.

Section 1-02.4 of the *Standard Specifications* requires that all requests for explanation or interpretation of the contract documents be submitted in writing. Anytime the answer to a question from a prospective bidder would provide additional information that would not be available to all bidders, the Project Engineer should immediately contact the Region Construction Manager or Region Plans Office in order to facilitate the preparation of an Addendum. Answers to such questions must be provided to all bidders in the same manner. If the question has to do with generic issues such as office procedures (for example, methods of payment calculation or handling requests for information,) the answer may be provided directly to the questioning party without involving other bidders.

All questions from prospective bidders regarding an advertised project should be referred to the Project Engineer listed in the “Notice to All Planholders” for a complete response. The Project Engineer will coordinate the effort to determine if any requested information needs to be addressed by an addendum.

1-2.1B Award and Execution of Contract

Bids for the contract are opened at a public meeting where each prospective bidder’s proposal is read and the Apparent Low Bidder is announced. Within 45 calendar days of bid opening, the proposals will be closely reviewed and the contract will be awarded to the lowest bidder deemed responsive. In accordance with Section 1-03 of the *Standard Specifications*, the successful bidder is then allowed 20 calendar days to return the signed documents that are necessary to enter into a contract with WSDOT.

After these documents are returned to WSDOT, the contract must be approved and executed. No proposal submitted by a Contractor is binding upon WSDOT prior to the date of execution by WSDOT. No work is to be performed within the project limits or WSDOT furnished sites prior to the execution of the contract by WSDOT. Any work that is performed by the Contractor outside of these areas, or any material that is ordered prior to WSDOT execution, is done so solely at the risk of the Contractor.

In order to ensure timely notification to the Contractor regarding execution of the contract and authority to proceed, the following procedure is used:

1. Immediately after execution of the contract documents by WSDOT, the State Accounting Services Office or (for Region Ad & Award projects) the Region Plans Office will notify the office administering the contract (the Regional Construction Manager’s Office, the Director of Terminal Engineering, or the Architecture Office). The State Accounting Services Office also notifies the State Department of Revenue, State Department of Labor and Industries, and other interested parties that the contract has been executed.
2. The Regional Construction Manager or a representative should contact the Project Engineer’s office as soon as notification is received. The Project Engineer should then contact the Contractor and provide notification of the execution date. The date, time, and method of notification in all instances should be recorded in the project diary.
3. Following the initial contact, the State Accounting Services Office or the Region Plans Office will send executed copies of the contract to the Contractor and the Project Engineer.

1-2.1C Preconstruction Meetings, Discussions

The Project Engineer is required to communicate with the Contractor for the purpose of discussing the project and exchanging a variety of information. Depending upon the complexity of the project, this information can be exchanged in any combination of the following methods:

- Information packets provided to the Contractor
- Letters transmitting information
- Informal meetings
- A single multipurpose formal meeting
- Several formal meetings with different purposes

If the Project Engineer decides that a formal meeting is necessary in order to successfully begin work on the project, a meeting should be arranged as soon as practical after the contract is awarded and the Contractor has organized for the work.

In the case of a project that includes utilities to be adjusted, relocated, replaced or constructed by a utility, or their contractor, during the performance of the contract, the Project Engineer shall facilitate a mandatory utility preconstruction meeting with the Contractor, all affected utility owners and their contractors prior to any on-site work. The Project Engineer should request assistance from the Region Utilities Engineer for help in getting utilities to attend this meeting. This meeting should include a discussion of all utility work schedules, in order to enable the utilities and the Contractor to coordinate their work, resolve schedule conflicts, and eliminate delays.

All information exchanged should be documented in the project records, by formal meeting minutes, by file copies of letters, or by diary entries.

The nature, amounts, and methods of communication with the Contractor are left to the Project Engineer. As a minimum, the following subject areas should be covered during the preconstruction time period:

- **CONTRACTOR WSDOT RELATIONSHIPS**

The Project Engineer should begin to develop a positive and effective relationship with the Contractor as soon as the contract is awarded. This is also a good time to introduce the concept of “Partnering” if it has not already been introduced on the project. The Project Engineer should strive to create an environment that encourages a cooperative approach to completing the project. This can be helped by beginning the development of a team consisting of both the Contractor’s and WSDOT’s project people. The level of authority delegated to each member of the Project Engineer’s staff should be discussed with the Contractor. In addition the methods of establishing the Contractor’s Performance ratings can be reviewed (Manual M 41 40) (see Chapter 1-2.8F of this manual for additional information). The Contractor should also be informed that there is an opportunity to evaluate the WSDOT construction process as well.

- **ENVIRONMENTAL COMMITMENTS**

If there are commitment files for the project, these should be made available and discussed with the Contractor. Any references in the *Standard Specifications* or the special provisions to environmental requirements or permits should be discussed. The Contractor’s responsibility to obtain any local agency permits should also be discussed. If rock crushers are involved in the project, the State Department of Ecology registration requirements should be discussed (WAC 173-400). In addition, a written record of this discussion should be sent to the regional office of the State Department of Ecology so that they are aware of the timing and location of the rock crushing operation.

- **ORDER of WORK AND TIME SCHEDULES**

In order for the Project Engineer to set up the required crews, arrange for any special inspections, provide timely reviews of submittals, etc., the project office must be made aware of the contractor’s schedule of work. In addition the contract specifications may include specific requirements for sequencing or durations for some items of work. The contract requirements for progress schedule or time for completion in accordance with Section 1-08, or as amended by the special provisions, can also be discussed.

- **SUBCONTRACTORS AND LOWER-TIER SUBCONTRACTORS**

In accordance with Section 1-08.1 of the *Standard Specifications*, the Project Engineer needs to become aware of the Contractor’s plans to delegate portions of the work to subcontractors. These plans must conform with the condition of award, if any, related to disadvantaged business enterprise participation. The Project Engineer should explain the requirements

and process involved for subcontractor and lower-tier subcontractor approval, including the prevailing wage rate requirements outlined in the contract documents (see Chapter 1-2.6 of this manual). WSDOT/Contractor/Subcontractor relationships should also be discussed. The Project Engineer should remind the Contractor that there is no contractual relationship between WSDOT and the subcontractors. All subcontractor correspondence with WSDOT should pass through the Contractor for submittal to WSDOT or vice versa. Contractor representation should also be discussed. It will be necessary for the Contractor to be represented at the job site at all times, even when there is only subcontractor work in progress.

- **UTILITIES, RAILROADS, AND OTHER THIRD PARTIES**

If the project affects or is affected by third party organizations, the Project Engineer must advise the Contractor about the relationships with the third parties and the expectations they hold regarding the actions of both WSDOT and the Contractor. The Project Engineer may wish to arrange face-to-face meetings with representatives of affected third parties. In the case of utilities, reference should be made to the underground locator services and the requirements to utilize them (see RCW 19.122). If WSDOT has agreed to notification time limits, these should be communicated to the Contractor. If special insurance is required by any agreements with third parties, then these requirements should be pointed out to the Contractor.

If utilities are to be adjusted, relocated, repaired or constructed by the utility during the performance of the contract, the Project Engineer shall facilitate a separate, mandatory, utility preconstruction meeting with the Contractor, the utility, and their contractors.

- **SAFETY AND TRAFFIC CONTROL**

The Contractor’s safety program should be discussed as outlined in Section 1-2.2I(3) of this manual. WSDOT has an interest in safe operations on the job and the Project Engineer should make clear that this interest will be protected. As part of a discussion of specific safety requirements of the particular work, safety considerations for workers and WSDOT personnel, such as safety zone requirements, vehicle intrusion protection, fall prevention, closed spaces, hazardous materials, work around heavy equipment, etc., should be addressed. The need for control of speed on all construction equipment should be emphasized.

The Project Engineer should describe WSDOT’s traffic requirements. The Contractor’s Traffic Control Manager (TCM), Traffic Control Supervisor (TCS) and WSDOT’s traffic control contact person should be identified and their responsibilities and authorities clearly stated. Any traffic control requirements that are unique or restrictive should be emphasized and addressed by the Contractor with respect to construction operations. Unacceptable delays to traffic should also be discussed.

The *Manual on Uniform Traffic Control Devices*, as adopted by WSDOT, is the legal standard for all signing, traffic control devices and traffic control plan requirements on the project. These standards have been incorporated into the project Traffic Control Plans (TCPs.) If the Contractor chooses to use these TCPs, they must be formally adopted in writing as required in Section 1-10.2(2) of the *Standard Specifications*. If the Contractor wishes to use some other traffic control scheme, then that plan must be submitted and approved in advance.

Flaggers and their intended locations must be included in the plans. When Flaggers are utilized, they must have a current flagging card and shall be equipped with hard hats, vests, and standard stop/slow paddles as required in Sections 1-07.8 and 1-10.3 of the *Standard Specifications*. Overuse of flaggers is not appropriate as “catch all” traffic control and should be discouraged. Safety of flaggers, through use of physical protection devices where practical, proper flagging methods and formulating an emergency escape plan, should be emphasized.

The Contractor and the Project Engineer should establish communication with the Washington State Patrol (WSP) and local law enforcement agencies. Law enforcement advice about traffic control should be considered. Arrangements for all law enforcement agencies to notify the project office about accidents near, or in, the construction area should be established, if possible. If WSP traffic control assistance is to be used, a general discussion of strategy and responsibilities should be included.

Off site hauling can pose a safety hazard to the public. WSDOT will cooperate with law enforcement agencies in the enforcement of legal load limit requirements and the covered load regulations. The Project Engineer should discuss this with the Contractor before any hauling begins.

- CONTROL of MATERIALS

The Contractor should be reminded of Section 1-06.1 of the *Standard Specifications*, requiring the Engineer’s approval of all materials prior to their use. In order to expedite these approvals, the Contractor should be encouraged to make these requests as early as possible. The Project Engineer should provide the Contractor with a current copy of the Record of Materials (ROM) for the project. The Project Engineer should discuss the ROM with the Contractor, covering the various requirements for sampling, catalog cuts, shop drawings, certification requirements, etc., which may be needed for approval of materials prior to their use. The requirements of Section 1-06.2 of the *Standard Specifications* for ongoing acceptance of approved materials prior to their being incorporated into the work, should also be discussed. If fabricated items will be needed, the inspection process for fabricated materials, including shop drawing approvals and notification requirements for fabrication inspectors, should also

be outlined. The requirements of Section 1-06.3 of the *Standard Specifications* that require manufacturer certifications prior to use of the materials should also be reviewed.

The Contractor should be reminded that, in order to avoid deferred progress payments for portions of work not completed, all necessary documentation for approval of materials and required certifications must be received and accepted prior to their use.

- OTHER SUBMITTALS

Discuss any other submittals that may be needed during the course of the contract. This may include Falsework and Forming Plans, Traffic Control Plans, Temporary Water Pollution/Erosion Control Plans, Schedules, Installation or Operating Procedures, or other Contractor initiated items requiring WSDOT review and/or approval. There are requirements for a number of submittals which, if not satisfied in a timely manner, could delay the initial progress payment. These include the Statement of Intent to Pay Prevailing Wages, the Progress Schedule, and the Training Plan. There may be others depending on the work to be done and as required by the contract provisions. The Project Engineer should identify and remind the Contractor of these requirements and the potential for deferred payments.

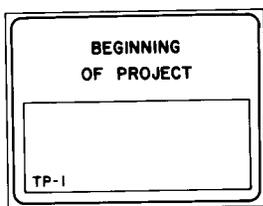
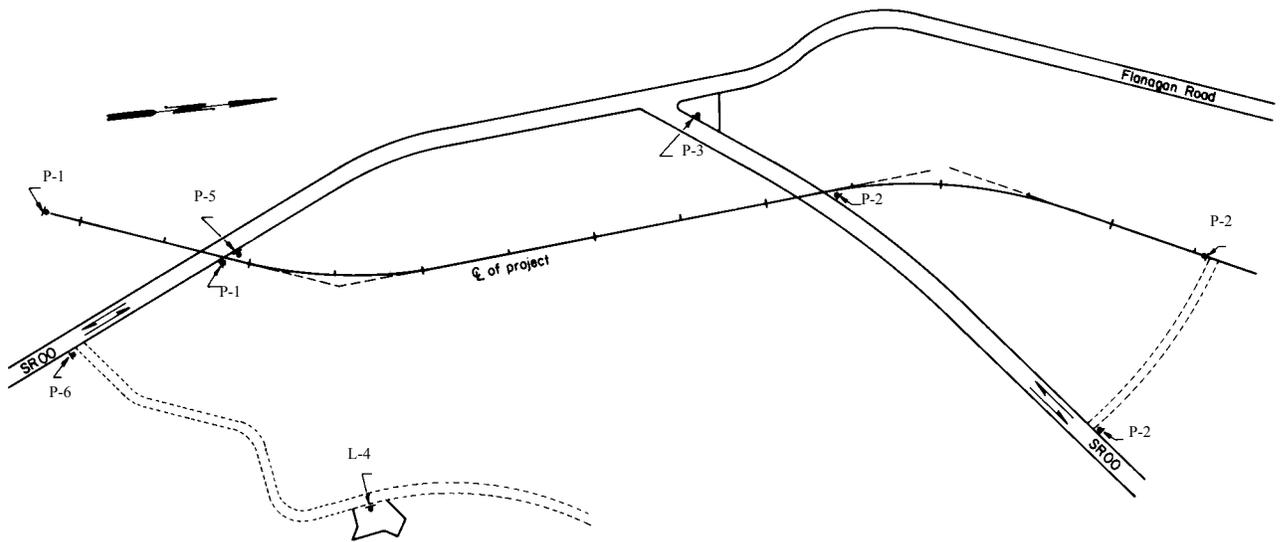
- DBE PARTICIPATION / EEO / TRAINING

The Project Engineer should briefly discuss and answer any questions the contractor may have with regard to the efforts, reports, and monitoring necessary to ensure successful performance for DBE *Participation, EEO, & Training*. Chapter 1-2.7A provides a breakdown of these various programs and the general requirements each contains. However, the specific requirements and contractor performance information are included in the *Standard Specifications for Road and Bridge Construction*, the Amendments included in the contract, as well as the contract specific special provisions titled *Equal Employment Opportunity Responsibilities*. If additional assistance or information is necessary, the Project Engineer could also request assistance from the Region EEO Officer, the State Office of Equal Opportunity, or the State Construction Engineer’s Office.

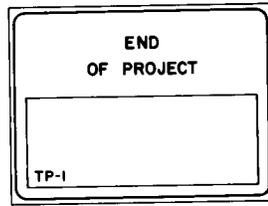
- WAGE RATE ADMINISTRATION

Advise the Contractor of the requirement to pay prevailing wage rates as identified in the Contract. Advise the Contractor that it is their responsibility to work directly with Washington State Department of Labor and Industries (L&I) for approval of the Statement of Intent to Pay Prevailing Wages (SI) and Affidavit of Wages Paid (AWP) and that:

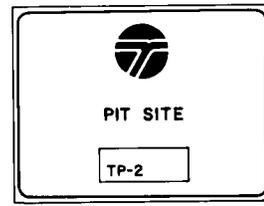
- The SI and AWP will be on forms provided by L&I.
- The forms will be obtained from L&I or can be filed electronically with L&I online at www.LNI.wa.gov/prevailingwage, if the contractor is registered by L & I to file electronically.



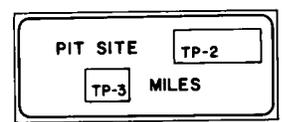
P-1



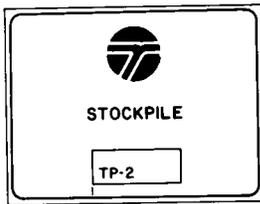
P-2



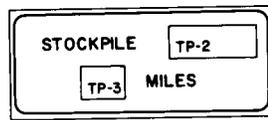
P-4



P-6



P-3



P-5

Notes:

This plan is typical. Any particular project should be signed to meet the physical conditions.

M6-1 Directional Arrow signs shall be installed as necessary.

See *Sign Fabrication Manual* for sign specifications.

Figure 1-3

- The contractors, subcontractors, lower-tier subcontractors, suppliers, manufacturers, and fabricators that are required to submit SI and AWP will pay the approval fee directly to L&I.
- The Contractor will provide the Project Engineer a copy of the approved forms (SI, before any payment can be made for the work performed and all AWP, before any retained percentage can be released). If payrolls are required, establish submittal deadlines in accordance with Section 1-07.9(5) of the *Standard Specifications*. Describe the wage rate interview process. Describe the required job site posters and provide them to the Contractor (See Chapter 1-2.6 of this manual). On all Federal-Aid contracts, the Project Engineer must remind the Contractor that the work falls under the guidance of Davis-Bacon and Related Acts and the Contract Work Hours and Safety Standards Acts. As indicated in Chapter 1-2.6C of this manual, the U.S. Department of Labor may conduct investigations to ensure compliance with these Acts.

- FORMS

The Project Engineer should provide the Contractor a description of all required forms, giving the Contractor an initial supply of each. Additional forms required by the Contractor over the course of the work should be provided by the Project Engineer upon request by the Contractor. Remind the Contractor that all form submittals, including those of subcontractors, lower-tier subcontractors, and suppliers, should be routed through the Prime Contractor for submittal to WSDOT.

- SUMMARY

While these issues are to be discussed with the Contractor in some manner at the beginning of each contract, the Project Engineer is free to select the most effective method of doing so. A formal preconstruction conference may or may not be the best solution. Perhaps a single meeting is adequate or several meetings may be required. The entire preconstruction communication may also be covered in a short meeting between the Project Engineer and the Contractor. The Project Engineer is responsible to address these subjects, inform the Contractor in some manner and maintain a written summary of the preconstruction meetings or discussions for the contract files.

The Contractor and Project Engineer may be knowledgeable about those normal requirements listed above. In this situation, some items need only be listed in a mailing as a convenience to the Contractor's staff. Unique features, constructability, and third party coordination should be focused on with as many of the interested parties as can be assembled.

The key is effective communication, getting the right message to the necessary people. Additional meetings may be required as people change, as new facets of the work become imminent, or as the project goes into a second or third season. In order to assist this process, a checklist has been developed as a tool for the project office's use. It can be used to help identify the issues and track them for completion through the various preconstruction communications. See Figure 1-4.

1-2.2 Project Engineer's Relationship and Responsibilities

1-2.2A Assignment

The Region will appoint a Project Engineer to act as the authorized representative of the Secretary of Transportation for each contracted project. After the contract has been executed by WSDOT, the Region may provide the Contractor with written confirmation of the name and address of the Project Engineer assigned. (The Region may rely on the special provisions and forego this letter, unless a change is made.) If a letter is sent, the Contractor should be reminded to send all correspondence and forms regarding the project to the Project Engineer.

The Project Engineer is then responsible for enforcement of the contract specifications and provisions and the completion of all work according to the plans. The Project Engineer supervises the work of WSDOT personnel assigned to the project and ensures that they perform their work in accordance with the Plans, specifications and all applicable WSDOT policies. The Project Engineer is responsible for keeping complete and accurate records of all construction data and work progress, preparing progress and final estimates, and preparing other records necessary for a complete documentation of the project, including a performance evaluation of the Contractor (see Chapter 1-2.8F).

Changes made to the project or substitutions for work detailed in the contract plans or specifications, must be made in accordance with the requirements of Section 1-04 of the *Standard Specifications* and the guidance provided by Chapter 1-2.4C of the *Construction Manual*. The Project Engineer should review the project on a regular basis with the Regional Maintenance personnel so they have an opportunity to present any maintenance problems that may arise.

The Project Engineer must, at all times, stay aware of the design implications of actions taken during construction. Change orders and undocumented field adjustments can affect the design standards utilized. If change orders or field adjustments affect the project design criteria, the changes must be documented, approved and incorporated into the Design Documentation Package. The Project Engineer shall contact the Region Project Development staff for guidance in documenting these design criteria changes.

1-2.2B Responsibility as a Public Official

The Project Engineer is responsible for a project that is affected by Federal, State, Tribal, and local laws, ordinances, and regulations. While no one could be familiar with every requirement, the Project Engineer should seek to understand as much as possible. Beyond that, the prudent Project Engineer will look for guidance and seek information related to whatever current issue is at hand. Legal requirements could affect State employees, those employed by the Contractor in performing the work, the materials to be incorporated, the equipment that is used on the project, or could otherwise affect the conduct of work.

If the Project Engineer discovers that any provision of the contract, plans, or specifications appears to be inconsistent with a law, ordinance, or regulation, the inconsistency should be investigated and, if appropriate, referred to the Region Construction Manager. The Project Engineer should, at all times, strive to comply with all laws, ordinances, and regulations.

1-2.2C Relationship With the Contractor

The Project Engineer must be familiar with the conditions of the contract, special provisions, and specifications for the work. The Project Engineer must attend to any reasonable request of the Contractor, i.e., furnishing grades, stakes, plans, etc., whenever necessary and within reason. In general, the Project Engineer should do all things necessary to enable the Contractor to work to advantage and without delay. The Project Engineer should not set any stakes or furnish to the Contractor any plans which are the responsibility of the Contractor to set or provide. The Project Engineer must ensure that the Contractor performs the work in accordance with the contract provisions, plans, and specifications.

Integrity on the part of all employees is essential. The attitude of the Project Engineer and staff toward the Contractor and the Contractor's personnel should be one of cooperation, consistent with the requirements of the specifications. It should be recognized that both the State and the Contractor have explicit rights under the contract and that both parties must respect those rights. The Contractor is generally trying to fulfill the contract honestly, and errors or difficulties, which may arise are usually due to a lack of information or a misunderstanding. If conflict should occur, the Project Engineer should make every effort to determine the cause of the conflict and make appropriate corrections.

1-2.2D Relationship With Other Government Agencies

Other agencies responsible for such things as flood control, land development, stream navigation, pollution, etc., may be affected by the work. The Project Engineer should attempt to determine that the Contractor has complied with all regulations known to be in effect. The Project Engineer is encouraged to obtain a copy of commitments from the project design file. This should be available from a region or project design office. This file should contain environmental permits, real estate commitments, utility commitments, design deviations, and other good important information. When the Contractor is specifically required by the contract

to obtain an approval document from other agencies, the Project Engineer must confirm that the document was received. Other approvals required of the contractor, but not mentioned in the contract documents should be confirmed to the extent that the requirements are known and the confirmation is possible. If a representative of an agency visits the project, the Project Engineer or an inspector should accompany the representative on the visit.

In carrying out construction work in forested areas, the Project Engineer should encourage the Contractor to comply with all Federal and State forest rules and regulations governing the protection of forests and the prosecution of the work within both national and State forests. The Contractor must take all precautions necessary to prevent and suppress forest fires. The Project Engineer shall report to the nearest forest fire warden at the earliest possible moment, the location and extent of any fire and shall take immediate steps to control the fire if practicable.

Construction work in or near streams, rivers, or other bodies of water may require a permit from the State Department of Fish and Wildlife. In an agreement with the agency, for each project requiring a Hydraulics Project Approval (HPA) (RCW 75.20.100), the State Department of Fish and Wildlife will issue the permit to WSDOT only and not to its contractor. One representative of the State Department of Fish and Wildlife will be assigned to coordinate requirements with the Project Engineer. The permit is specific to the work provided for in the contract itself and will not cover other work in support of the project, such as operations in Contractor staging areas, material sources, or waste sites. When a Hydraulics Project Approval has been obtained for the project, and the permit has not been incorporated into the contract documents, the Project Engineer shall provide copies of the permit to the Contractor and ensure it is properly posted at the work site at all times work is in progress. The Project Engineer should ensure that both the intent and the specific provisions of the permit are rigidly enforced. If the Contractor's method of operations, weather conditions, design changes, or other factors affect waters of the State in ways not anticipated or represented in the Hydraulic Project Approval, the Project Engineer will work with the assigned representative and the Contractor to modify the existing permit or obtain a new or revised one as appropriate.

The U.S. Department of Labor, Mine Safety and Health Administration, Metal and Non-Metal Mine Health and Safety Division, 3633 136th Place SE, Suite No. 206, Bellevue, Washington 98006, (206) 553-7037, must be notified at the beginning and closing of all mining operations. This includes surface mining, such as our normal pit site operations. Notification is required for all crusher operations and for all pits and quarries, including borrow pits, which are separated from the roadway under construction. The Project Engineer is responsible for this notification for WSDOT furnished pits and must submit the required report as soon as the date of opening or closing can reasonably be determined. The Contractor is responsible for notification for all pits and quarries not furnished by WSDOT. The Bureau of Mines reports are in addition to reports required by the Department of Natural Resources.

Whenever construction work is performed in navigable waterways, it is necessary to obtain a construction permit from the Coast Guard. One of the requirements of the construction permit is regular submission of Bridge Construction Progress Reports. Two copies of the report should be prepared by the Project Engineer sufficiently in advance of the first working day of the month and transmitted to the State Bridge and Structures Engineer. When a Coast Guard permit modification is proposed (by the Contractor or WSDOT), it shall be submitted to the Bridge and Structures Engineer for processing through the Coast Guard. The time required for approval/disapproval of the proposed permit modification is variable and depends on the nature and significance of the modification. Up to six months may be required. When all construction obstructions to navigation have been removed, the Project Engineer shall report that fact immediately to the Bridge and Structures Engineer indicating the date removal was completed. Upon completion of all permitted bridge work, a final report indicating the date of completion and certifying that the bridge has been constructed in compliance with the Coast Guard Bridge Permit shall be submitted by the Project Engineer to the State Bridge and Structures Engineer.

1-2.2E Relationship With Public and Private Utilities

In some cases, utility adjustments will be completed prior to contract work. In other cases, adjustments are to be made concurrently with the work. The Project Engineer and the Contractor should meet with the public utility companies, individuals, and others owning or maintaining utility features within the limits of the highway right of way and confirm the relationship, the terms of the relocation agreements, and the relocation work schedule. Where the feature will require adjustment during construction, notice should be provided far enough in advance to allow the utility to perform the adjustment without affecting the Contractor's work schedule.

Utilities should have been given prints of the preliminary plans, prior to awarding of the contract, showing grade lines and right of way to enable them to prepare plans and estimates for making the necessary changes to their facilities in as timely a manner as possible. The Project Engineer should determine that plans for the work have been made, that the relocated facilities will be clear of the construction, and that the utilities coordinate with the Contractor's operations to the fullest extent possible.

When utilities are known to exist within the limits of the project and are not planned for relocation but may be affected by the Contractor's construction activities, the Project Engineer and the Contractor should become familiar with the requirements of RCW 19.122, Underground Utilities. The Project Engineer may wish to obtain copies of the RCW for review at Preconstruction Meetings.

The approximate locations of most existing underground utilities are shown on the contract plans. However, the existence of some underground utilities may not have been known or detected during design. If a one number locator service is available, the Contractor must utilize it in an attempt to locate all affected utility features. If no one number locator service is available, notice shall be provided

individually to those owners of underground facilities known to have or suspected of having underground facilities within the area of proposed excavation. Even areas covered by a one number service may contain utilities not included in the service. If the Contractor discovers underground facilities which are not identified, the Contractor shall cease excavating in the vicinity of the facility and immediately notify the owner or operator of such facilities, or the one number locator service.

1-2.2F Responsibility for Coordination of Railroad Agreements

When railroads are involved within the project limits, an agreement covering the work involved is usually entered into between WSDOT and the Railroad Company. Upon identifying that the contract involves work or involvement by a railroad, the Project Engineer should immediately obtain a copy of the Railroad Agreement or contact the Region Utilities Engineer to determine the status of the agreement and to make sure it contains all elements needed to accommodate the construction of the project. If an agreement has not been made with the railroad, the Project Engineer should coordinate and monitor the development and processing of the agreement through the Region Construction and Region Utilities Engineers. Where notices are required. The Project Engineer should ensure that proper notice is provided to the railroad company and that such notice is acknowledged by them. The Project Engineer should work with the Region Construction Manager and Utilities Engineer to resolve any conflicts with the Railroad Company and prevent delays to the Contractor's operations.

1-2.2G Responsibility for Railroad Encroachment Insurance

Projects which include work on railroad right of way generally require special insurance protection. Pay particular attention to the Contract Special Provisions for project requirements because they vary from project to project. It is the responsibility of the Project Engineer to enforce the provisions. The required insurance documents are to be furnished by the Contractor (usually through the Project Engineer) to the State Accounting Services Office who will (a) review the documents and (b) obtain approval of the insuring documents from the railroad company. Written notification of approval by the railroad company will be furnished to the Project Engineer by the State Accounting Services Office as soon as approval is obtained.

No work shall be started on railroad property until the necessary approvals have been obtained. The railroad insurance must be maintained until the date of physical completion of the project unless otherwise stated. However, the Contractor may make a written request to be relieved of the responsibility to continue all or part of the railroad protective liability insurance before the completion date under certain conditions. The details and conditions for this relief are specifically set forth in the special provisions of the contract. If the Contractor should make a request for relief, the Project Engineer should contact the Region Construction Manager and Utilities Engineer for guidance and assistance in coordinating this effort with the railroad.

Preconstruction Communication Checklist _____

Contract Number: _____

Project Engineer: _____

Contractor: _____

Subject	Communication Type (Letter, Min. of Mtg., Info. Packet, Diary) Completed (Date)	File Location
A. Contractor-WSDOT Relationships	_____	_____
1. General Discussion	_____	_____
2. Contractor Performance Ratings	_____	_____
B. Environmental Commitments	_____	_____
1. Commitment Files	_____	_____
2. Contract Provisions	_____	_____
3. Rock Crushers	_____	_____
C. Order of Work and Schedules	_____	_____
1. Discuss Plans for Prosecution	_____	_____
2. Formal Schedule Required	_____	_____
D. Subcontractors and Lower Tier Subs	_____	_____
1. General Discussion	_____	_____
2. Condition of Award	_____	_____
3. Paperwork Process	_____	_____
4. WSDOT/Prime/Sub Relationship	_____	_____
5. Correspondence through Prime	_____	_____
6. Prime represented on site	_____	_____
7. WSDOT will address sub concerns	_____	_____
E. Utilities, Railroads, and Other Third Parties	_____	_____
1. Existing Agreements described	_____	_____
2. Commitments, Obligations, Notices	_____	_____
3. Underground Locater Service	_____	_____
4. Insurance requirements	_____	_____
F. Safety and Traffic Control	_____	_____
1. Discuss Contractor's Safety Program	_____	_____
2. Traffic Control Requirements	_____	_____
3. Police Relationships	_____	_____
4. Job-Specific Safety Concerns	_____	_____
5. Off-site Hauling Restrictions	_____	_____
G. Control of Materials	_____	_____
1. Source Approvals Needed	_____	_____
2. Acceptance Procedures	_____	_____
3. Fabricated Items	_____	_____
4. Installation without Certifications	_____	_____
H. Other Submittals	_____	_____
1. Job-Specific List and Discussion	_____	_____
2. Delay of 1st Progress Payment	_____	_____
I. Equal Employment Opportunity and Training	_____	_____
1. Contract EEO Requirements	_____	_____
2. Contract Training Requirements	_____	_____
3. Training Plan/Trainee Appr. Process	_____	_____
4. Monitoring and Reporting	_____	_____
J. Wage Rate Administration	_____	_____
1. Prevailing Rates Required	_____	_____
2. Payrolls, Wage Rate Interviews	_____	_____
3. Davis-Bacon investigations	_____	_____
K. Forms	_____	_____
1. Describe Req. Forms, Provide Supply	_____	_____

1-2.2H Responsibility for Coordinating Work With Other Contracts

When two or more Contractors, including any utility or their contractor, are working in the same area, Section 1-05.14 of the *Standard Specifications* will apply. The Contractor shall not cause any unnecessary delay or hindrance to the other contractors on the work, but shall cooperate with other contractors to the fullest extent. Progress schedules and plans for all contractors involved should be reviewed by the Project Engineer to detect possible conflicts which might be resolved before a delay of work is experienced or extra costs are incurred as a result. If an adjacent project requiring coordination is known prior to holding a Pre-Construction meeting, it would be beneficial to invite principals from that project to the meeting.

1-2.2I Responsibility for Enforcement of Safety and Health Requirements

1-2.2I(1) General

All contractors doing work for WSDOT must provide safety controls for the protection of life and health of the Contractor's employees and other persons, for the prevention of property damage, and for the avoidance of interruptions in the performance of the work under the contract. As the owner contracting agency, WSDOT has the responsibility for enforcement of the provisions of the contract, however, provisions and regulations which are by law the fundamental responsibility of other agencies, both from the standpoint of interpretation and enforcement, should be monitored by WSDOT, but with full recognition as to the responsibilities and authorities of those agencies. The Project Engineer will cooperate fully with the responsible agency.

Any violations noticed by the Project Engineer will be brought to the attention of the Contractor for correction. The Project Engineer will also notify the responsible agency (if that action is deemed necessary by the Region Construction Manager) and utilize such sanctions as are consistent with contract terms in assisting the responsible agency in enforcing laws, rules, and regulations.

The Contractor is obligated by law to comply with both State and Federal safety regulations. State regulations are administered by the Washington State Department of Labor and Industries under the Washington Industrial Safety and Health Act (WISHA). Federal regulations are administered by the Occupational Safety and Health Administration (OSHA) and the Mine Safety and Health Administration (MSHA) of the U.S. Department of Labor, which has jurisdiction over Federal safety requirements for pit and quarry operations up to the point where materials leave the quarry area or go into a batch plant. Inspectors from any or all of these agencies may review the Contractor's operations at any time. (See Section 1-07.1 of the *Standard Specifications*.) in order to fulfill WSDOT obligations to monitor contract operations in accordance with the above, the following procedures should be followed on both Federal-aid and non Federal-aid contracts.

1-2.2I(2) Precontract Preparation

- The Project Engineer shall obtain the WISHA manuals, particularly Safety Standards for Construction Work WAC 296-155, General Safety and Health Standards WAC 296-24, and General Occupational Health Standards WAC 296-62, and shall review them with the key field WSDOT inspectors to ensure reasonable familiarity to the extent that they can recognize important requirements.
- The Contract Plans and contract provisions should be reviewed to identify those aspects of the work meriting special attention from the standpoint of potentially dangerous types of work and hazard elimination.

1-2.2I(3) Preconstruction Duties

As part of the Preconstruction Meetings and Discussions (see Chapter 1-2.1C), the Contractor's safety program should be discussed. Some of the things that the Project Engineer may want to consider are:

- The contractual obligation of the Contractor for complying with State and Federal construction safety standards. (See Section 1-07.1 of the *Standard Specifications*.)
- The availability of the safety standards that apply to the contract.
- The accident prevention program of the Contractor — organization, staff, names of responsible individuals, meetings, training, reports, etc. A review of specific areas for which plans are required (especially those also affecting WSDOT personnel). These might include Fall Protection, Confined Spaces, Respirators, Hearing, and Hazardous Materials plans. Implementing a mechanism for employees to report "near misses" and/or work zone accidents.
- The Contractor's responsibility for seeing that subcontractors comply with safety regulations.
- The Contractor's plans for meeting specific safety requirements and for eliminating potentially critical hazards on the project.

1-2.2I(4) The P.E.'s Role in Safety on the Project

It is difficult to generalize about safety. It's a judgment call which is dependent on risk, knowledge, authority to direct corrections, etc. As people, professionals and representatives of the State, Project Engineers have an obligation to take action if they become aware of a situation that presents an immediate threat. Project Engineers should advise their employees on what the lines of communication are and what the procedures are for alerting the responsible agencies with regard to serious safety hazards.

Employees should be made aware that the Contractor is obligated to make the work-site safe, to their satisfaction, for inspection activities. Anyone who is uncomfortable with access for inspection should inform their supervisor of the situation and expect resolution. Project personnel should also be made aware of project specific hazards and be trained in specific areas as the project warrants. For example; fall

protection, confined space requirements, respirator training, lead paint hazards, hazardous material training, and exposure to medical waste (sharps). It is suggested that the expertise of the Regional Safety Officers or Headquarters Safety Office be utilized as appropriate.

Additional information, such as safety regulations and Department of Labor and Industry (L&I) contacts, are available on the Internet at <http://www.wa.gov/lni/>. Keep in mind that many WSDOT employees are not trained to interpret and apply safety regulations; however, employees need to have a reasonable understanding of what hazards may be encountered on a project. Many, but not all, of the requirements are listed under Chapter 296-155 WAC, "SAFETY STANDARDS FOR CONSTRUCTION WORK" under the various "Parts A through V".

State L&I offers consultation service (advice is given) and enforcement (assessment of a violation would result in a citation being issued). A listing of phone numbers for the various L&I field offices is as follows:

- REGION 1 Offices

Bellingham Field Services Location	360 647-7300
Everett Field Services Location	425 290-1300
Mount Vernon Field Services Location	360 416-3000
- REGION 2 Offices

Bellevue Field Services Location	425 990-1400
Seattle Field Services Location	206 <u>515-2800</u>
Tukwila Field Services Location	206 <u>835-1000</u>
- REGION 3 Offices

Bremerton Field Services Location	360 415-4000
Port Angeles Field Services Location	360 417-2700
Tacoma Field Services Location	253 596-3800
- REGION 4 Offices

Aberdeen Field Services Location	360 533-8200
Longview Field Services Location	360 575-6900
Tumwater Field Services Location	360 902-5799
Vancouver Field Services Location	360 896-2300
- REGION 5 Offices

East Wenatchee Field Services Location	509 886-6500
Kennewick Field Services Location	509 735-0100
Moses Lake Field Services Location	509 764-6900
Yakima Field Services Location	509 454-3700
- REGION 6 Offices

Colville Field Services Location	509 684-7417
Pullman Field Services Location	509 334-5296
Spokane Field Services Location	509 324-2600

1-2.2I(5) Pedestrian Safety

When the work area encroaches upon a sidewalk, crosswalk, or other areas that are near an area utilized by pedestrians or bicyclists, special consideration should be given to their accommodation and safety. Pedestrians are more susceptible to personal injury in work areas than are motorists. Visibility and recognition of hazards is an important requirement for the safety of pedestrians and bicyclists.

Protective barricades, fencing, handrails, and bridges, together with warning and guidance devices, should be used so that pathways for pedestrians, bicyclists, equestrians, and other non-motorists are safe and well defined. Where walks are closed by construction or maintenance, an alternate walkway should be provided where feasible. Where it is necessary to divert pedestrians into the parking lane of a street, barricades and delineation should be provided to separate the pedestrian walkway from the adjacent traffic lane. Pedestrians should not be diverted into a portion of the street used by vehicular traffic. At locations where adjacent alternate walkways cannot be provided, pedestrians can be diverted across the street by placing appropriate signs at the construction limits and at the nearest crosswalk or intersection. When hazardous work conditions exist overhead, it may be necessary to install a fixed pedestrian walkway of the fence or canopy type to protect and control pedestrians. In such cases, wood and chain link fencing can be used with warning lights and illumination to warn and guide both pedestrians and motorists. These accommodations for pedestrians and bicycles should be included in Traffic Control Plans.

Fences around a construction area are often necessary and may be a requirement of the local jurisdiction building code. They are often constructed in conjunction with a special pedestrian walkway or when there are deep excavations or when pedestrian access to the job site is not desirable. Installation of such fencing must take into account relocation of existing control devices and facilities such as traffic signals, pedestrian signals, traffic signs, and parking meters. The use of chain link fencing which can be seen through may be needed at intersections to provide adequate sight distance.

Relocating a walkway without unreasonable inconvenience to pedestrians, residents, or commercial interest, is the safest practice of all. Remember, however, that pedestrians like to "see what's going on". Simply denying them access does not, of itself, prevent their encroachment onto the worksite. Sometimes it is advisable to design and construct a pedestrian observation area for this purpose.

1-2.2J Responsibility for Environmental Considerations

During the precontract period, the Project Engineer should obtain copies of the final Environmental Impact Statement and any special environmental studies related to the project. It is important that all key personnel become familiar with the environmental decisions considered during the design process. The contract documents should include necessary provisions for protection of the environment, including requirements that the Contractor secure permits from and abide by regulations of appropriate Federal, State, and local agencies. Any changes in contract work that may become necessary must also be reviewed to ensure conformance with the original intent, requirements, and commitments established during the environmental design of the project.

1-2.2J(1) Spill Prevention, Control, and Countermeasures (SPCC) Plans

Spill Prevention, Control, and Countermeasures plans are written by the Contractor to prevent, respond to, and report hazardous material spills in a safe and effective manner. SPCC Plans should include information regarding the project site and contractor activities as they relate to spill prevention, control, and response activities. Additionally, SPCC Plans should identify possible sources of hazardous materials, methods to prevent and control spills, and spill response procedures. Plans are written and maintained by the Contractor and are required on all WSDOT projects, regardless of the size or duration of construction activities.

SPCC Plans are applied to the life of a construction project and may need to be amended over time with changing conditions. Periodic inspections will ensure that the required preparation and preventative steps identified in the SPCC Plan have been taken to keep the site in compliance throughout the life of the project.

The *Standard Specifications* provide the complete list of required contents for the Contractors SPCC Plan in Section 1-07.15(1).

1-2.2K Responsibility for Environmental Compliance During Construction

The following procedure pertains to WSDOT personnel on all WSDOT contracts and contains duties and activities by persons other than the project staff, but all of which are related to construction contracts and affect the Project Engineer to one degree or another. The Project Engineer must stay aware of this procedure and follow it as written.

1-2.2K(1) Environmental Compliance Assurance Procedure

The purpose of the Environmental Compliance Assurance procedure is to recognize and eliminate environmental violations during the construction phase on Washington State Department of Transportation (WSDOT) construction sites, and to ensure prompt notification to WSDOT management and agencies. For purposes of this procedure, violations are defined as actions that are not in compliance with environmental standards, permits, or laws.

When any action (Notification Trigger) below occurs or if there are questions about compliance, the Project Engineer (PE) shall initiate this procedure to develop corrective actions to solve the identified problem. The Regional Environmental Manager (REM) will serve as a resource to the PE and give priority to addressing the actions, activities, or situations that stem from notification triggers. The PE and REM will work together on an appropriate response to the notification trigger to avoid or minimize environmental damage.

A. Notification Triggers: "Notification Triggers" (listed below) means an action, activity, or situation that requires the Project Engineer to implement the Environmental Compliance Assurance Procedure.

1. Notice from a resource agency that a violation has occurred;
2. Any action that, in the judgment of the REM, contractor or Project Engineer, may violate environmental permit conditions, agreements, or approvals for the project; or other environmental laws, ordinances, or regulations;
3. Any unauthorized work, activity, or fill in wetlands, shorelines, creek beds (including dry channels), other waters of the state, or critical habitat;
4. Any emergency protection activity that involves unauthorized placement of fill in wetlands, shorelines, creek beds (including dry channels) or waters of the state or for bank stabilization activities where fill or structures are placed on the bank;
5. Any action or project revision requested by an agency after a site inspection that may be in conflict with other permits;
6. Any spill, discharge or release of hazardous materials, oil, or chemicals to land or water;
7. Any situation that results in a fish kill, or if dead or dying fish are discovered in the vicinity of the project;
8. Activities that monitoring shows are out of compliance.

B. Notification and Resolution Process: In the event of a notification trigger, the following steps shall be taken:

1. If a notification trigger is observed first by the contractor or REM, the contractor or REM shall immediately notify the Project Engineer.
2. The Project Engineer must:

Step 1. Immediately notify the Contractor of the situation, implement emergency response procedures including agency notification, and suspend all non-conforming work on the site.

Step 2. Immediately notify the Regional Environmental Manager (REM). Consultation with the REM must occur before any remediation actions are taken.

Step 3. In consultation with REM assemble the following information

- a. The activities that triggered the notification and why they occurred.
- b. Location of the work.
- c. Potential solutions to the problem, or if additional investigation is needed, the agreed upon course of action.
- d. Any related site constraints or safety issues.
- e. Urgency of the issue

Step 4. Notify his or her immediate supervisor.

Step 5. *Notify the Regional Administrator.

Step 6. In consultation with the REM, determine the resource agencies having jurisdiction and who will notify them.

Step 7. Document all actions, conversations and activities.

3. The Regional Environmental Manager must immediately:

Step 1 *Notify the Director of Environmental Services.

Step 2. Notify his or her immediate supervisor.

Step 3. Work with the Project Engineer to resolve the issue that caused the notification trigger.

Step 4. Identify and obtain appropriate permits or permit revisions with the aid of the Project Engineer.

Step 5. Document all actions, conversations, and activities. Communicate issues and send appropriate documentation to Regulatory and/or Resource Agencies.

4. *The Director of Environmental Services must immediately:

Step 1. Notify Compliance Branch Manager and any other ESO Program Managers associated with the resource issue.

Step 2. Notify Director of Environmental & Engineering Programs.

Step 3. Notify the Regional Environmental Manager that the Director of Environmental & Engineering Programs has been contacted. Regional Environmental Manager must then notify the Project Engineer that the violation reporting procedure has been completed.

5. *The Regional Administrator will:

Step 1. Coordinate with the Director of Environmental & Engineering Programs to contact the Assistant Secretary of Engineering and Regional Operations advising him or her of the situation, and provide updates as needed on the situation.

Step 2. Ensure that the Project Engineer and the Regional Environmental Manager have the necessary resources, authority and organizational support to successfully resolve the environmental problem.

C. **Timing:** Due to costs of project delays, or risk of not acting quickly during emergency situations, the REM shall provide a 24 hour contact person for environmental consultation.

D. Documentation:

1. The Project Engineer shall document the details of the notification and problem resolution in the contract records.

2. The Regional Environmental Manager shall maintain a record of all regional non-compliance events. REMs shall collect and maintain, at a minimum, the following data on all non-compliance events:

- a. Project name and Location
- b. PE and Prime Contractor
- c. Incident Date
- d. Incident Description
- e. Permit/Regulation Violated
- f. Resource Agency(s) notified and date of notification
- g. Whether or not resource agency staff conducted site review in response to notification
- h. Record of NOV's and/or penalties issued

The REM shall provide all regional non-compliance tracking data to ESO Compliance Branch Manager for the purposes of annual reporting and review of compliance performance.

3. *For violations, the appropriate documentation needed to record the violation, and achieve resolution, including any preliminary mitigation solutions, will be collectively developed by the Project Engineer and the Regional Environmental Manager, and shall be coordinated with and sent to the appropriate regulatory and/or resource agency.

E. Roles and Responsibilities:

1. "Project Engineer" is the person responsible for the project and administration of the construction contract. This responsibility may be delegated to a subordinate employee on site, but the ultimate responsibility for making sure these procedures are followed will be with the Project Engineer. The Project Engineer shall have a thorough knowledge of all of the environmental permit conditions and design requirements for the project, and have such certifications and other qualifications as may be required.

2. "Regional Environmental Manager" is the person responsible for administering the regional environmental program. This responsibility may be delegated to a subordinate employee with knowledge of environmental permitting and procedures, but the ultimate responsibility for setting and interpreting regional environmental policy will be with the Regional Environmental Manager.

3. "Contractor" is as defined in Section 1-01.3 of the *Standard Specifications for Road, Bridge, and Municipal Construction (2002)*.

**Denotes that the action is mandatory when the violation 1) results in agency enforcement staff coming on site to conduct enforcement review; and/or 2) there is a high likelihood the event will result in NOV's or penalty.*

1-2.2L Responsibility for Posting Required FHWA and State Labor and Industries Job Site Posters

A combination of both State and Federal laws require that on all WSDOT administered contracts some or all of the posters listed below are to be posted at the place of employment such that all employees have ready and free access to inspect their contents. The Project Engineer must ensure that the Contractor complies with these requirements.

- FHWA 1495 and 1495A — Wage Rate Information
- FHWA 1022 — Fraud Notice Poster
- OFCCP-1420 — Equal Employment Opportunity is the Law
- WISHA P416-081-000 — Job Safety and Health Protection
- E242-191-909 — Notice to Employees (L&I)
- F700-074-000 — Your Rights as a Worker
- EMS 9874 — Notice to Employees (Emp. Security)
- Copy of approved Statement of Intent to Pay Prevailing Wages
- Copy of prevailing wage rates from the contract provisions

If Federal funds are involved, all of these posters are required. If only State funds are involved, the first three do not apply. After contract execution and before work begins, the Contractor should be given a package containing the appropriate required job site posters. This package should also be accompanied by either a written or verbal explanation of the contents and include notification that the Contractor, each subcontractor, and each lower-tier subcontractor will have to post a copy of the State L&I approved Statement of Intent to Pay Prevailing wages. This action shall be specifically noted in the project records.

1-2.2M Responsibilities When Working on Tribal Lands

Indian nations have the political distinction of being sovereign. This is different from being designated as having protected group status based on racial classifications. Being sovereign, tribes have the ability to create and enforce tribal ordinances such as Tribal Employment Rights Ordinances (TERO). These are legal requirements pertaining to work within the boundaries of the reservation which are enforced by the respective tribes. When a contract includes work on a reservation, the project should include a general special provision “Indian Preference and Tribal Ordinances” that alerts the contractor to the possibility that TERO requirements may apply and provides a contact person for the tribe. The provision also reminds the contractor to bid any costs associated with TERO compliance into associated items of work. TERO requirements may take a variety of forms, some of which are listed in the noted provision. The provision also notes that complying with TERO requirements shall not be a violation of the contract equal employment opportunity requirements. The end result is that the

contractor is expected to comply with TERO requirements as they would any other legal obligations. The underlying intent is to reduce Indian unemployment and most tribes are willing to work with contractors to best meet this goal. We want to avoid creating any contractual requirements that interfere with their ability to do so. Our role is to assist in communication but not become involved in determining or paying the tax.

1-2.2N Responsibilities Following Unanticipated Discovery of Cultural Resources

Given the wealth of historical and archeological resources found in Washington, the Project Engineer should be familiar with the requirements of the National Historical Preservation Act (NHPA), Standard Specification 1-07.16(4), and any contract specifications regarding the discovery of cultural resources. The Project Engineer should discuss these requirements with the Contractor and WSDOT staff at the Pre-Construction Conference. These resources include, but are not limited to:

- Human skeletal remains,
- Anthropogenic soil horizons (areas showing the influence of humans on nature), occupational surfaces (areas showing evidence of human activity or habitation), midden (refuse heap), etc.,
- Areas of charcoal or charcoal-stained soil and stones,
- Stone tools or waste flakes (i.e. arrowheads of stone chips),
- Bones, burned rocks, or other food related materials in association with stone tools or flakes,
- Clusters of in cans or bottles,
- Logging or agricultural equipment more than 50 years old.

When the project provision notify the Contractor of the likelihood of discovering cultural remains, the Project Engineer should have a project specific ‘Unanticipated Discovery Plan’ on file. A sample of may be found at <http://www.wsdot.wa.gov/eesc/environmental/culres/default.htm>. The Cultural Resources Office, at the Headquarters Environmental Services Office, will assist with completing the plan.

1-2.2N(1) Discovery of Human Skeletal Remains

The following guidance is given to assist the Project Engineer when construction activities cause disturbance to human skeletal remains. All human skeletal remains, which may be discovered, shall at all times be treated with dignity and respect.

Should any WSDOT employee, contractor, or subcontractor believe that he or she has discovered human skeletal remains; the following steps shall be initiated:

1. Ensure that all work adjacent to the discovery has ceased. The area of work stoppage shall be adequate to provide for the total security and protection of the integrity of the human skeletal remains.

2. Immediately notify the Project Engineer. The Project Engineer shall:

- a. Notify the Region Construction Manager.
- b. Immediately notify the local sheriff, or other appropriate law enforcement official, requesting that a person who is competent and qualified to identify human skeletal remains be present. Do not call 911 or the media.
 - i. No persons other than the proper law enforcement personnel, WSDOT Cultural Resources staff and SHPO (State Historical Preservation Officer) will be authorized direct access to the discovery location. This access must comply with all safety and security procedures.
 - ii. The local sheriff may arrange for a representative of the county coroner's office to assist WSDOT Cultural Resources staff, SHPO, and the affected tribe(s), in the examination of the human skeletal remains to determine ethnic origin; and will determine whether the discovery site will be treated as a crime scene or as an archaeological site.
- c. Notify the WSDOT Cultural Resource Manager at HQ Environmental Services, who will notify:
 - i. Regional FHWA Administrator
 - ii. State Historic Preservation Officer (SHPO)
 - iii. WSDOT Tribal Liaison Office. The WSDOT Tribal Liaison Office will contact the affected tribe(s) and notify them of the unanticipated discovery.

3. If the human skeletal remains are determine to be of Native American ancestry, tribal access will be allowed to the designated representative(s) of the affected tribe(s). WSDOT and FHWA will make a good faith effort to accommodate requests from affected tribe(s) to be present, prior to implementation of mitigation measures. The Project Engineer, WSDOT Cultural Resources, SHPO, and the affected tribe(s), in consultation, will determine what treatment is appropriate. If disinterment of Native American remains becomes necessary, FHWA, WSDOT, SHPO, and the affected tribe(s) will jointly determine the final custodian of the human skeletal remains for reinterment.

1-2.2N(2) Discovery of Other Cultural Resources

The following guidance is given to assist the Project Engineer when construction activities cause the disturbance of cultural resources, other than human skeletal remains.

Should any WSDOT employee, contractor, or subcontractor believe that he or she has uncovered a cultural resource, at any point in the project, the following steps should be initiated:

1. Ensure that all work adjacent to the discovery has ceased.

2. Immediately notify the Project Engineer. The Project Engineer shall immediately notify:

- a. The Regional Construction Manager
- b. The WSDOT Cultural Resource Manager at HQ Environmental Services who will notify:
 - i. FHWA Regional Administrator
 - ii. State Historic Preservation Officer (SHPO)
 - iii. WSDOT Tribal Liaison Office. WSDOT Tribal Liaison Office will notify the affected tribe(s).

3. Ensure that the area of work stoppage is adequate to provide total security and protection of the integrity of the resource. Vehicles, equipment and unauthorized personnel will not be permitted to traverse the site, nor will work resume, until treatment of the cultural resource is completed.

4. All archeological deposits discovered during construction are to be treated as if they are eligible for inclusion in the NRHP (National Register of Historical Places).

5. If cultural resources are discovered, but additional project effects to the resource are not anticipated, project construction may resume, away from the site of the discovery, while documentation and assessment of the resource proceeds.

1-2.3 Construction Traffic Control

1-2.3A Public Convenience and Safety

1-2.3A(1) General

Under the many special conditions encountered where traffic must be moved through or around construction operations, serious problems of traffic control can occur. Most conditions are temporary and are, therefore, dangerous and difficult to deal with because they are unexpected and not in accordance with the normal pattern of highway traffic. Section 1-07.23(1) of the *Standard Specifications* requires the Contractor to conduct all operations with the least possible obstruction and inconvenience to the public and to provide adequate safeguards, safety devices, protective equipment, and any other needed actions to protect the life, health, safety, and property of the public. The responsibility to comply with these requirements is the Contractor's. It is the Project Engineer's responsibility to ensure that the Contractor complies.

1-2.3A(2) Work Zone Clear Zone (WZCZ)

When a project requires traffic control, a Work Zone Clear Zone (WZCZ) shall be established and will apply during both working and non-working hours. During non-working hours no equipment or materials shall be within the WZCZ, unless it is protected by permanent guardrail or temporary concrete barrier (location and installation to be approved by the Project Engineer). During working hours, unless protected as stated for non-working hours, only materials or equipment absolutely necessary to construction shall be allowed in the WZCZ or allowed to park on the shoulder of the roadway.

The minimum clear zone distance, measured from the edge of traveled way, shall be based on the posted speed as follows:

Posted Speed	Distance From Traveled Way
35 mph or less	10 Ft.
40 mph	15 Ft.
45 to 55 mph	20 Ft.
60 mph or greater	30 Ft.

Any deviation from these requirements shall only be allowed if the Contractor has requested the deviation in writing and the Engineer has provided written approval. The Region Traffic Office should be contacted to help evaluate the deviation and determine if the requested deviation is approvable.

1-2.3A(3) Temporary Breaks in Limited Access for Construction

The Federal Highway Administration (FHWA) cannot delegate its approval authority to add access points to existing limited access controlled Interstate facilities through the WSDOT-FHWA Stewardship Agreement. The FHWA has granted approval to break limited access in order to gain access to the worksite from adjacent properties. This approval was granted through the FHWA approval of Standard Specification Section 1-07.16. This approval does not extend to allowing the contractor to use this access to merge construction vehicles and equipment with public traffic in the traveled way, auxiliary lanes or shoulders. It is therefore necessary to seek approval from the FHWA when proposing to break limited access and merge construction vehicles with public traffic in the traveled way, auxiliary lanes, or shoulders.

Standard Specification Section 1-07.16 allows the contractor to access the worksite from adjacent properties but does not allow the contractor to merge construction vehicles or equipment (including contractor workforce vehicles of any type) from that access with public traffic. Standard Specification Section 1-07.23 allows the Interstate highway system to be accessed through existing facilities or through access points allowed within the contract only. These access points allowed in the contract will either be in the form of site specific traffic control plans or by contract provisions included in the contract documents.

A General Special Provision (GSP) to allow the contractor to merge construction vehicles with public traffic in the traveled way, auxiliary lanes or shoulders may be included in the contract provisions. Consultation with Region and Headquarters Design and approval by the FHWA must occur prior to deciding to include this GSP in a contract on Interstate facilities.

If the contractor proposes to merge construction vehicles with public traffic in the traveled way, auxiliary lanes or shoulders and the contract contains the GSP that allows this access, then the contractor shall submit a site-specific plan for traffic control in accordance with the MUTCD Part VI. The Region Traffic Engineer should review this plan and it should be submitted to FHWA.

During construction on Interstate projects the Project Engineer will notify the FHWA Area Engineer by sending them a copy of the approved vicinity map showing the location of the access break and site-specific traffic control plan. FHWA approval of a PS&E containing this GSP constitutes approval of access from adjacent properties to the traveled way, auxiliary lanes or shoulders.

While some contracts may not contain provisions for breaking limited access for construction and for merging of construction vehicles with mainline and/or interchange ramp traffic, the contractor may request one. If the Region agrees and the project is on limited access controlled Interstate, the FHWA Area Engineer shall be contacted for approval. The contractor shall submit a vicinity map showing the location of the access break, a site-specific plan for traffic control in accordance with the MUTCD Part VI, and the duration for which the accesses will be in operation. On non-interstate limited access controlled facilities, approval will be required by the Region. If approval is granted and the facility is a limited access facility, the GSP will be added to the contract by change order. On all other roadways the Project Engineer may approve the access with Region concurrence.

1-2.3B Public Information and Customer Focus

Most drivers still have the expectation of proceeding to their destination with little or no delay even though traffic conditions on many of our highways are deteriorating, primarily due to increased traffic volume. This increased volume may create congestion, delays, accidents and aggressive driving during normal daily operation. Highway construction will usually require a more restricted roadway to accommodate work zones and can further reduce traffic mobility and safety. Even some of our lower volume rural highways can present a challenge due to factors such as drivers not expecting construction work and seasonal/recreational traffic increases. Construction and user delays present significant costs in addition to costs associated with crashes and worker safety. These delays and costs can be minimized by implementing a traffic control strategy based on traffic conditions and construction requirements, and which includes public information and customer focus considerations.

Our goal on every highway construction project should be to provide the best overall balance of work zone safety and traffic mobility while constructing quality highway projects. Much of our effort is directed at engineering responses to safety and mobility issues and is generally included in the contract requirements. Recent customer focused highway construction studies have shown that accurate and timely project information is a valuable element in an overall traffic control strategy. Advance planning and coordination between the project engineer and contractor is necessary to ensure that there is an opportunity to provide public information for all phases of the project that impact traffic. Proper use of public information and customer focused techniques will provide safety and mobility benefits that would not otherwise be gained, as listed below:

- Alert drivers to potential delays by advance notice through project signing and the news media that would allow drivers to take alternate routes, adjust scheduled trips and have better awareness of traffic impacts and how to avoid them.
- Provide benefits to the Contractor from reduced traffic volume and better driver awareness through fewer crashes, less material delivery delay, better worker safety, fewer complaints and overall public acceptance of the project.
- Achieve better driver acceptance, reduced aggressive driving and improved work zone credibility by minimizing delays and providing accurate and timely information.
- Consider innovative construction techniques and shorter term intense work stages with more severe traffic restrictions, such as weekend closures, if possible.
- Closely monitor traffic conditions when traffic is restricted to determine the need for any traffic control or work hour adjustments that would improve traffic flow. Specified working hours and the accompanying traffic restrictions are critical elements of the project traffic control strategy and should not be adjusted without proper traffic analysis.
- Maintain ongoing communication during the life of the project with local law enforcement, emergency services, local agencies, transit groups, affected local businesses, etc.
- Continue use of innovative devices such as portable, changeable message signs, project information signs with information phone number and highway advisory radio systems.

The Regional Construction Manager, Traffic Engineer, and Public Information Officer should be involved in the project traffic control strategy and may be able to offer assistance.

1-2.3C Work Zone Traffic Control

1-2.3C(1) General

The primary function of work zone traffic control is to move vehicles and pedestrians safely through or around work zones while protecting on-site workers and accommodating the contractor's construction operations.

All work is to be performed by the contractor under the contractor's control and supervision. All resources are to be provided by the contractor unless the Special Provisions of the contract specifically states that the department will provide some resource(s), what those resources will be and how they are to be utilized. Such provided resources will be placed in the contractor's control to be used in the contractor's operation. Any additional resources provided to the contractor during the project should be accompanied by a change order to the contract and, where appropriate, a price reduction.

The "General" requirements for traffic control (Section 1-10.1) address the responsibility to provide adequate traffic control measures at work zones as follows:

- No work shall be done until all necessary signs and traffic control devices are in place and/or conflicting and confusing signs are covered.
- If the Contractor does not provide necessary traffic control, WSDOT may do it and deduct the cost from the Contractor's payments.
- The Contractor is responsible regardless of whether or not WSDOT orders, furnishes, or pays for necessary traffic control.

It is important for the Project Engineer to ensure that the Contractor has an approved traffic control plan in place and implemented providing all necessary signs and other traffic control devices so that the traveling public is aware of all deviations from the normal traffic conditions and is furnished adequate direction and guidance to permit safe travel through the construction area.

WASHINGTON STATE PATROL (WSP) TRAFFIC CONTROL ASSISTANCE

Washington State Patrol (WSP) troopers may fulfill two roles on a construction project. In the first case, troopers may be dispatched to participate in the Contractor's traffic control activity, perhaps as Flaggers or Spotters, perhaps to operate a vehicle during one-way piloted operations or rolling slowdowns. The WSP role will be defined in the contract provisions.

WSDOT has an agreement, GC9131, with the Washington State Patrol (WSP) for that agency to provide troopers and vehicles to help with traffic control on construction projects. WSP traffic control assistance is considered an enhancement to the required work zone traffic control and should be reserved for those work zones that have unusual hazards or a high degree of worker exposure to traffic, which cannot be addressed by traditional traffic control means.

The Project Engineer should ensure that good communication is maintained with WSP troopers assigned to the project and that the appropriate traffic control strategy is applied. On each shift of WSP traffic control assistance, Form 421-045, WSP Field Check List, shall be filled out. WSDOT will fill out the top portion of the form and give it to the WSP trooper on the project to complete. At the end of the officer's shift, the completed form shall be returned to WSDOT.

The Contractor shall direct the activities of the WSP troopers assigned as a labor resource provided by the State.

Instructions for WSP assistance are in Instructional Letter "IL 4008.00" and the *Traffic Manual* M 51-02.

The second case of WSP involvement is in the area of enforcement. In this case, the troopers are not considered to be a State-provided resource and do not participate in the Contractor's traffic control work. When this situation occurs, WSP is present (at WSDOT expense) to provide enhanced, increased and visible enforcement of all traffic regulations, including those installed by the Contractor in the course of the work.

Enforcement officers are simply doing more of what they usually do. Their presence or lack of presence is due to administrative decisions by the department and WSP that are completely independent of the contract. They are not to be considered a provided resource, there shall be no entitlement to their services and neither the Contractor nor the Project Engineer shall direct their activities.

As stated above, a mid-project decision to provide troopers would be a change order. To be fair to unsuccessful bidders, such a change would need a price adjustment if nothing else had changed.

1-2.3C(2) Traffic Control Management

GENERAL

“Traffic Control Management” (Section 1-10.2) addresses the requirements and duties of the Contractor’s management personnel responsible for traffic and the Traffic Control Supervisor (TCS). The Contractor has the responsibility for managing traffic control and providing safe traffic control measures that are appropriate for the type of work and consistent with the requirements of the contract plans and specifications. The Contractor’s traffic control work is a contract activity. Just like other contract activities, it is associated with pay items. The activity must be inspected for adequacy and conformance with the contract. Once it is performed and inspected, associated contract items must be measured and paid. Traffic management actions affect not only the Contractor’s work operations, but also those of subcontractors. The process for coordinating and approving those actions must be well defined and consistent with the contract requirements.

Contractor management and the TCS work together with the Project Engineer and WSDOT’s traffic control contact person to address traffic control issues as the work progresses. Planning and coordination of the Contractor’s work efforts with appropriate traffic control measures are the primary responsibilities of contractor management. It is also the responsibility of management to ensure that any adopted State-provided or approved Contractor-proposed Traffic Control Plans (TCPs) needed to implement the contract work operations are provided to the TCS and that any necessary resources to implement the TCP are available.

TRAFFIC CONTROL SUPERVISOR

The TCS ensures that the traffic control measures shown on the approved traffic control plans (TCPs) are properly implemented, operating, and documented on the project. The Contractor’s TCS may not be required full time on the project, but is required to perform all the duties required by the specifications. When the Contractor is working multiple shifts, it may be necessary to have more than one person assigned to the role.

In addition to the Contractor’s responsibility to designate a Traffic Control Supervisor, WSDOT may designate a DOT employee who is qualified, but not necessarily certified, to serve as the State’s traffic control contact. It is intended to have qualified, trained representatives from both the Contractor and WSDOT work together to achieve safe traffic control operations on the project.

Among the duties of the Project Engineer in the area of Traffic Control are the following:

- **Communication:** About the planned work, traffic control needed and adjustments to the approved Traffic Control Plan. During the work, to stay aware of changes, events and issues.
- **Monitoring:** The activities of the Contractor TCS and traffic control workers. The status of signs and control devices. Conformance with specifications and requirements.
- **Documentation:** Obtaining and reviewing daily reports. Handling Traffic Control Plans and their approvals.
- **Coordination:** With adjacent projects, with DOT Traffic offices, notices to the media.

The Project Engineer may assign these duties in any manner. It would make sense to include the State’s traffic representative in these activities.

When reference is made to the “Traffic Control Supervisor (TCS) in these provisions or in the *Standard Specifications*, it shall mean the Contractor’s Traffic Control Supervisor unless stated otherwise.

TRAFFIC CONTROL PLANS

“Traffic Control Plans” (Section 1-10.2(2)) addresses the requirements of Traffic Control Plans (TCPs). The Contractor must either adopt the TCPs appearing in the contract or propose modified TCPs to be used for the project. The Contractor must submit proposed modifications to plan TCPs or alternate plans at least ten calendar days in advance of the time the traffic control will be required. Approval of these plans must be obtained before the work can begin.

The possibility of alternate plans is covered by the contract. No change order will be needed because of that reason. However, if a price adjustment is needed then a change order will be necessary to accomplish that. We would allow additional payment, either through added units or revised lump sums, only if the original contract TCP was shown to be inadequate or in the case of traffic control needed for another change in the work. If the proposal is only for contractor convenience or preference, then a discussion of no pay for added traffic control or a credit for less traffic control would be appropriate. If the contractor should balk at this, the response could be “build according to plan.”

Minor modifications to the TCP may be made by the Traffic Control Supervisor to accommodate site conditions. Modifications or adjustments to the plan must maintain the original intent of the plan. When there is a change in the intent and/or substantial revisions are needed, a revised TCP shall be submitted for approval through the TCM to the Project Engineer. The Regional Traffic Office should be consulted when this situation occurs. Again, changes may call for a formal change order.

Traffic Control Plans should not only address all work zones and standard devices and signs but should also address issues such as:

- Conflicting or temporary pavement markings
- Maintaining existing operational signs and covering conflicting signs
- Staging requirements
- Temporary vertical or lateral clearance restrictions
- Temporary work zone illumination
- Consistency with any existing work hour restrictions
- Position of positive barriers for traffic hazards or worker protection
- Vertical drop-offs
- Work zone access
- Intersection or access control (traffic signals, road approaches)
- Pedestrians and bicycles
- Work zone capacity and related mobility impacts

If the Contractor's method of operation or the work area conditions require other than minor modification of the specific TCP appearing in the contract or any of the TCP's previously designated and adopted by the Contractor, the Contractor shall submit a proposed modification of the TCP for approval. If the Contractor's proposed modifications comply with the MUTCD requirements and are consistent with contract requirements as well as State and Region policy, the Project Engineer may approve these proposed modifications (perhaps utilizing a change order, if appropriate.) If the Contractor's proposed modifications do not comply with the MUTCD requirements, the Project Engineer should consult with the Region Traffic Engineer.

Any Contractor proposed TCP or modifications to an existing TCP should be evaluated for their affects on work zone safety and mobility. The Project Engineer should refer to the guidance in the *Design Manual* Chapter 810 Work Zone Safety and Mobility when evaluating how the new TCP works within the projects overall Transportation Management Plan (TMP).

If there is any doubt that the proposed TCP complies with the MUTCD or provides for the safe movement of traffic, the Project Engineer shall consult with the Region Traffic Engineer or the Region Construction Manager.

CONFORMANCE to ESTABLISHED STANDARDS

"Conformance to Established Standards" (Section 1-10.2(3)) addresses the requirements for standards and condition of flagging, signs, and all other traffic control devices. In addition to standards established in the latest adopted edition of the "*Manual on Uniform Traffic Control Devices*" (MUTCD) and/or as specified in the contract plans, the "National Cooperative Highway Research Project, 350"

(NCHRP 350) has developed requirements for safety of four categories of traffic control devices. Category 1 devices consist of small lightweight devices that generally do not present a hazard. Typical Category 1 devices are cones, tubular markers, and plastic drums with no attachments. Conformance to NCHRP 350 for Category 1 is described in Section 1-10.2(3) and applies only to those devices purchased by the Contractor after January 1, 2000. The Contractor is required to keep the manufacturer's certification document on file and available for inspection if needed. Inspection of certification documents by WSDOT is not routinely required but should be considered if operational or safety issues are observed.

Category 2 contains devices that are more hazardous due to their rigid construction, such as barricades, portable sign stands, intrusion alarms, and drums with lights. The collision test certification rules apply to all new devices purchased after October 1, 2000. Older equipment falls under a "grandfather" clause until 2008. Signs and stands are considered a unit until both wear out. A sign or a stand can be replaced with non-compliant equipment until the 2008 deadline.

Category 3 devices are fixed or substantial in mass and could cause significant damage to a vehicle or its occupants. Devices such as barriers, fixed sign supports, and TMAs are included in this category. WSDOT approved devices in this category currently meet NCHRP 350 standards.

Category 4 devices are typically trailer or truck mounted and could cause significant damage if impacted by an errant vehicle. Devices such as arrow boards, PCMS, portable signals, and portable lighting units are included in this category. Implementation of requirements for Category 4 devices is not presently scheduled.

1-2.3C(3) Traffic Control Labor, Procedures and Devices

1. TRAFFIC CONTROL LABOR

All traffic control labor must be trained with a video about safety in the work zone. Flaggers and spotters have additional requirements concerning flagging cards and apparel.

All flaggers and spotters working on WSDOT construction projects must have a valid State of Washington flagging card or a flagging card issued by the states of Oregon, Montana, or Idaho. Flaggers and spotters are required to wear high visibility clothing as specified in Section 1-07.8 of the *Standard Specifications*. Other workers involved in traffic control may certainly use this type of clothing, but doing so is not a contract requirement.

Flaggers used as spotters to protect an exposed work crew may be considered appropriate if other worker safety measures are not feasible. Before the Project Engineer approves the use of a spotter not shown on a contract plan, careful evaluation of the hazards involved should indicate that the spotter could actually provide a safety benefit to the work crew without undue risk to the spotter.

FLAGGERS AND SPOTTERS

Typically, flaggers have the highest exposure to traffic hazards and are more frequently injured or killed than other workers. Flaggers should only be used when all other forms of traffic control are inadequate to control traffic. When flaggers are used, flagging stations must be shown on the TCP along with the required illumination, warning signs and devices. Flagger stations should be protected with a positive barrier, if possible. The flagger should also have in mind an "escape plan" to avoid errant vehicles. It is not recommended to use flaggers at locations, such as freeways, where their primary function of warning or directing traffic is ineffective or not intended. Use of flaggers to exclusively display the "SLOW" message is also not recommended and is, in fact, not required by the contract. The provisions call for a flagger with intermittent responsibilities to direct traffic to step back from the flagging station between tasks. Additional guidance on the use of flaggers is located in the "*Traffic Manual*" and the "*Work Zone Traffic Control Guidelines Book*."

OTHER TRAFFIC CONTROL LABOR

For some projects, labor in addition to the assigned Flaggers and Spotters is needed for a variety of traffic-related tasks. Some of these tasks are listed in the provisions. Hours for this item are measured only for work on certain defined tasks (see Section 1-10.4(2)).

2. TRAFFIC CONTROL PROCEDURES

ONE-WAY TRAFFIC CONTROL

The major points to note in Section 1-10.3(2)A are:

- The provision does not limit one-way traffic control to treated bases, surface treatments, and pavements. This type of configuration can be used in other operations, such as grading, when appropriate.
- Line of sight is important in coordination of side roads and approaches with the limits of the one-way operation.
- When the contract does not stipulate a pilot car operation (i.e., bid proposal does not include such an item,) a new item can be established by change order if the Engineer deems that method of traffic control to be most appropriate; and
 - Contractor vehicles and equipment may utilize the closed lane in any manner. The one-way controlled open lane is for public traffic and, should the contractor use that lane, all rules and procedures applicable to public traffic will apply to the contractor. There will be no "wrong-way" travel in the open lane, no heavy equipment will join the public traffic and any additional traffic control will be performed according to approved plans only.
 - The contractor is required to plan and conduct operations so that the roadway can be reopened to two-way traffic at the end of the shift. If the nature of the work prevents this, or if the work area is left in a condition unsafe for public two-way traffic, then the contractor must continue the one-way operation throughout the off-shift hours.

ROLLING SLOWDOWN

This can be a useful method of creating gaps in traffic for very short-term activities. The key is planning and communication. If all goes well, the gap will arrive at the site and be of long enough duration that the activity can be completed. If this breaks down, the contractor must undertake the most expeditious method of restoring the open roadway. If demobilizing and pulling off is faster than finishing the task, then demobilizing is the path that will be followed, without regard to cost, efficiency or schedule.

LANE CLOSURE SETUP/TAKEDOWN

The use of truck-mounted attenuators with arrow boards is required by the provisions. This combination is to be used during the transition from open lane to closed lane. Once a lane is closed, the TMA may be removed, leaving the arrow board alone.

MOBILE OPERATIONS

The key to this operation is to keep the traffic control equipment effectively close to the work and moving to match the work operation. Two traffic protection devices are used. One is a TMA/Arrow Board combination upstream of the work. The primary purpose of this device is to protect the errant vehicle from fixed object collisions. The second device is immediately adjacent to the work area. Its purpose is to protect the workers from the errant vehicle.

PATROL & MAINTAIN TRAFFIC CONTROL MEASURES

This activity is to observe, repair and maintain traffic control devices and layout. The provisions require an hourly visit to each device and layout. Depending on the extent of the control measures, more than one patroller may be required.

3. TRAFFIC CONTROL DEVICES

CONSTRUCTION SIGNS

The standard of these provisions is that the contractor provides all signs, posts and supports. If the special provisions do not promise that some or all of these will be furnished by the State, then the contract requires the contractor to do it all.

"Do Not Pass" and "Pass With Care" signs are the responsibility of the Contractor. The provisions explain how to determine the number of these and that determination is to be made by the Contractor as well.

Construction Signs (Section 1-10.3(3)) divides construction signs into two categories, Class A and Class B, and lists the work required for the Contractor.

At no time should signs be left in traffic control position during periods when they are not necessary to traffic safety. Indiscriminate use of traffic control signs soon destroys public confidence and respect for the signs. Unnecessary traffic restriction and inconvenience tends to reduce the effectiveness of all signing and causes difficulty in enforcement by authorities. The

Project Engineer should ensure that signs are removed or completely covered with metal or plywood during the hours they are not needed, either before or after working hours and on nonworking holidays or nonworking weekends.

Signing for nighttime traffic is more difficult than that required for daylight hours. A review of the project signing should be made and recorded during the hours of darkness.

Signs and other traffic control devices should be shown on the traffic control plan (either State-provided or contractor-submitted) approved and in use and should be installed with adjustments for work zone and traffic conditions. The Contractor and WSDOT should ensure proper use and placement of signs and devices. For situations not addressed by the TCPs, the Project Engineer will determine who is responsible for preparing a revised TCP. Refer to the Work Zone Traffic Control Guidelines Book, MUTCD, or seek assistance from the Region Traffic Engineer for appropriate TCP revisions. A modified or new TCP may be needed if adjustments to signs and devices do not adequately address existing hazards or resolve observed traffic problems or accidents.

Judgment will be required when a traffic control plan is changed. The project engineer must determine if the change has arisen because of a flaw in the original plans or because of the contractor's activities or preferences. In the first case, a change order, perhaps with compensation, may well be needed.

The remaining devices listed in the provisions are the following:

SEQUENTIAL ARROW SIGNS
 PORTABLE CHANGEABLE MESSAGE SIGN
 BARRICADES
 TRAFFIC SAFETY DRUMS
 BARRIER DRUMS
 TRAFFIC CONES
 TUBULAR MARKERS
 WARNING LIGHTS & FLASHERS
 TRUCK-MOUNTED ATTENUATOR

The specifications for these devices should be sufficient to explain their use and requirements.

1-2.3C(4) Measurement

Measurement is the key element of the new provisions, which now contain lump sum bid items. The provisions will define one of several pay item strategies, which will determine the measurements to be made.

First, the "normal" project with these provisions will contain items. The items are different from previous contracts and are non-standard, although several have very similar item names. Each of these is described below.

Instead of items, the project may be designated as a "Total Project Lump Sum." This will be the case if the item "Project Temporary Traffic Control, Lump Sum" is included in the proposal. If this is the strategy of the project, then all measurement and payment provisions for all other pay items are deleted from the contract. When this occurs, then all temporary traffic control costs of whatever nature (everything defined in Section 1-10) are included in the lump sum.

The project may be a lump sum hybrid. In this case, the Total Project Lump Sum item will be present, but the provisions will reinstate one or more of the deleted standard items. If that happens, the measurement and payment of the reinstated item(s) will be separate from and not included in the lump sum.

These are the items and a discussion of the features of the measurement spec for each:

Traffic Control Supervisor (lump sum). Previously paid by the hour, this item is now a fixed cost. Overtime is not considered, a second TCS for a night shift makes no difference. This lump sum status will likely cause TCS to become a part of change order negotiations. If the change does, in fact, require additional TCS work, then there would be entitlement. This will also apply to extended contract duration, as the TCS can be considered part of on-site overhead.

Flaggers and Spotters, (per Hour). This contract activity is separated from other kinds of traffic control labor. It is measured according to the hours that an approved flagging station is manned. We will not count minutes and seconds; time will be rounded up to the half hour as specified in Section 1-09.1. If a station is manned, but full-time presence of the flagger is not necessary (trucks entering roadway, equipment crossing) then the flagger is expected to step back out of harm's way until the next event. No deduction will be made for this stepping back, provided the flagger can not be assigned to other duties while waiting. In measuring flagging, disregard overtime, split shifts, union rules for show-up time, the trade classification of the flagger and any other payroll issues. The flagging is a service that is provided and paid by the hour. It is only peripherally related to the flagger's paycheck.

Spotters may be used and are encouraged. Spotter stations must be shown on the TCP and approved. Once approved, the item will be measured when the approved station is manned. The same rules apply to the non-relationship between Spotter payment and the paycheck of the spotter employee.

Other Traffic Control Labor (per Hour). There are other duties for traffic control labor besides flagging and spotting. Some of them are included in this item for separate measurement. If one of the activities listed in the provision is provided, then measurement of that activity is appropriate. Only the hours that the activity is performed will be measured. Again, this is not a payroll measurement.

Note the limit under patrolling and maintaining. No matter how many people are involved in this activity, measure only one hour for each hour that each approved route is operated.

Another little feature shows up under the last bullet (Installing and removing devices). Time spent ahead of the setup marking layout points on the shoulder or getting signs ready in the yard will be measured under this item.

Do not succumb to pressures to add other hours to this item. As the payment spec for “Other Temporary Traffic Control” states, all costs not compensated by other items are covered there.

Construction Signs, Class A (per sq. ft.) to qualify for payment under this item, the sign must be designated as Class A on an approved TCP or be directed installed by the Engineer and designated as Class A at the time of direction. After-the-fact re-designations of signs that have been originally thought to be Class B should not be considered.

Other Unit Price Items. The new traffic control provisions limit unit items to major devices. These include Sequential Arrows, Changeable Message Signs and Truck Mounted Attenuators. The measurement and payment requirements for these are similar or identical to those which have been in use for some time and are relatively straightforward.

One point to make is with the force account item for “Repair Truck-Mounted Attenuator. Because this is a temporary installation and not a part of the permanent work, the Third Party Damage item does not apply and that is why a separate force account is established. If the damage was caused by a third party, the department may well be able to recover the costs paid to the Contractor under this item. The Project Engineer should take steps to protect the department’s interest and involve the Maintenance, Accounting and Risk Management offices to initiate the efforts to recover costs.

1-2.3C(5) Payment

The payment provisions of the new specifications are intended to provide a mechanism that accounts for all of the Contractor’s costs for temporary traffic control. The total project lump sum item is self-explanatory. There is no additional payment unless there is a change order.

If the job contains items, the pay definition for each describes the limited portion of the Contractor’s costs that are covered by each item. The summary lump sum item (Other Temporary Traffic Control) is written to be a catchall cleanup that lets nothing escape for “additional compensation” discussions.

Watch out for change orders. A principal concern over lump sum items is that work will be added that is not required by the original contract and no mechanism exists to increase traffic control payment. This can be straightforward in identified changes, merely becoming an additional aspect of the negotiation. More troubling are constructive changes, which are not written, but which do end up in negotiation. An “overrun” of asphalt pavement to add a few driveways may be a convenient way to do field decisions, but may also create a dispute over the related traffic control costs (not to mention the dispute about the changed nature of the paving.).

1-2.3C(6) Construction and Maintenance of Detours

Construction zone detours will normally be detailed in the plans. When detours not shown in the plans are required, the design will likely be done by the construction office under the direction of the Project Engineer and requirements of the MUTCD. If the detour is a full-fledged roadway, design and traffic reviewers should check the design. Short-term minor detours may be installed and operated without formal review, but the Project Engineer must be satisfied that the facility is suitable and safe for traffic use.

Existing pavement markings on asphalt pavement should never be merely blacked out with oil or paint. Rather, the striped and adjacent areas should be sandblasted or ground in a pattern different from the original marking until the marking is no longer visible. This change in pattern minimizes the possibility that the original marking will still be visible to drivers, especially at night or in rainy weather when covered-over stripes have a tendency to shine in contrast to the pavement. Temporary pavement marking tape, either for temporary lane marking or masking of existing markings may offer another option.

Barricades and barriers are inherently fixed object hazards. Therefore, they should not be used unless the combined hazard for the motorist and the workers of operating without barriers is greater than the hazard of striking the barriers themselves. They should not be used as primary delineation to guide traffic. Delineation devices must be maintained, and kept clean. When delineators become covered with grime or are damaged, they become ineffective. The condition and positioning of these devices should be checked daily.

1-2.3C(7) Road/Ramp Closures

When it is necessary to close a road, street, or ramp, the Project Engineer shall submit a request that includes the appropriate closure/detour plan to the Region Traffic Engineer in advance of the need. Per RCW 47.48.010, the Regional Administrator may close a road, street, or ramp.

With proper planning and implementation, road/ramp closures can be an effective and safe method of traffic control. As required by RCW, notice of the closure shall be published in one issue of a newspaper in the area in which the closure is to take place. Signs indicating dates and times of the closure shall be placed at each end of the section to be closed on or before publishing the notice in the newspaper. Publishing the notice and placing of the signs shall be a minimum of three days in advance of the closure. Advance notice using local radio, portable changeable message signs or HAR may be effective in diverting traffic from the closed or impacted locations.

Coordinate with the Region Public Information Officer for assistance with public notification.

In cases of emergency, or closures of 12 hours or less, the road, street, or ramp may be closed without prior notice to the public. If possible, a notice should be posted one working day in advance of the closure.

1-2.3D Speed Reductions

If speed reductions are considered, the Project Engineer shall consult with the Regional Traffic Engineer in advance of the need. Per RCW 47.48.010 and Directive D55-20, the Regional Administrator may post advisory speeds and/or establish a reduced regulatory speed limit. Speed reductions must be determined in accordance with standard traffic engineering practice by the Regional Traffic Engineer.

- **ADVISORY SPEED**

Within a construction area, there may be short sections of roadway, such as curves or rough roadway, which may not be safely negotiated at the established speed limit. For these areas, an advisory speed sign should be used in conjunction with proper warning signs. The speed shown on the sign is not intended as an enforceable limit but should show, in multiples of 5 miles per hour, a safe speed for normal conditions of weather and lighting. Advisory speed signs should only be used in conjunction with appropriate warning signs.

- **REGULATORY SPEED LIMITS**

Traffic controls that are designed and implemented for site specific work zone conditions, including actual traffic speed, are generally more effective than a speed limit reduction. Speed limit reductions should be considered at work zones where conditions reduce operational safety to a point where other traffic control measures are not effective.

Directive D55-20 describes the appropriate conditions and requirements to implement advisory speeds and reduced regulatory speed limits.

1-2.3E Records of Construction Signing, Collisions, and Surveillance

Due to the increased damages being awarded by the courts for improper signing, it has become more important that detailed records of signing and delineation be continuously maintained on every project on sections of highway within the construction limits under traffic. The following are recommended procedures and methods of recording the signing on the project:

- Use extensive photographic, digital or videotape records.
- The Contractor's signing must adhere to the TCP, and the records must confirm that the sign installation is checked against that plan. The Regional Traffic Engineer should only be involved in significant changes to TCPs and need not be involved in minor adjustments.
- Documentation of the Contractor's activity for traffic control, including signing, should be completed by the Contractor's Traffic Control Supervisor (TCS). In accordance with the *Standard Specifications*, the TCS must maintain a daily project traffic control diary. DOT Forms 421-040A, "Contractor's Daily Report of Traffic Control- Summary", and 421-040B, "Contractor's Daily Report of Traffic Control Traffic Control Log," are provided to the Contractor for this purpose.

The Summary report will typically contain a brief description of the daily activities of the TCS with expanded details of any important happening such as traffic collisions, meetings, decisions, or rapidly deteriorating conditions of traffic or weather.

The Summary report is usually sufficient to verify the location and status of Class A signs once they are installed.

- The Traffic Control Log report is used to specifically identify all details of each Class B work zone setup. This includes identification of specific signs used, location of the signs, location of flaggers, location of the work zone, the time it was set up, and the time it was removed. Additional information includes cone layout, if used, comments about piloted traffic, and comments about the relationship of the setup to an approved traffic control plan.

The Project Engineer should make an effort to become aware of any traffic collisions that occurs within the project area. Where possible, thorough records should be maintained about the collision, including site conditions and the status of signing and other traffic control measures. In case of an incident investigated by the WSP, do not move signs until released to do so by the trooper. When inspections are made of the work zone, either by project or region personnel, the documentation of these inspections should be maintained in the project files. The 1997 report on Highway Work Zone Reviews contains recommendations for review procedures and reporting format. The report emphasizes the following points:

- Each Region should designate an office or individual responsible for oversight of traffic control issues.
- Regions should conduct regular reviews of traffic control with management involvement and document results.
- Expand discussion of work zone traffic control within the Region.
- Regions will take the lead in scheduling statewide annual traffic control reviews.
- State Traffic Office will prepare an annual summary of the statewide traffic control reviews.

1-2.3F Resources for Traffic Control and Work Zone Safety

The following information may provide additional guidance and more specific detail. Also, this list includes the staff, reference documents and manuals mentioned throughout Section 1-2.3 of this manual.

- *Work Zone Traffic Control Guidelines*, M 54-44
- *Traffic Manual*, Chapter 5, M 51-02
- MUTCD Part VI
- Work Zone Safety Task Force Recommendations
- Quality Standards for Work Zone Traffic Control Devices (ATSSA)

- Work Zone Traffic Control Supervisor's Notebook
- Highway Work Zone Reviews, 1997 (Work Zone Safety Task Force)
- Planning and Scheduling Work Zone Traffic Control (FHWA-IP-81-6)
- Directive D 55-20, Reduced Speed in Maintenance and Construction Zones
- Instructional Letter IL 4008.00, "WSP Traffic Control Assistance in Work Zones"
- Traffic Control Supervisor Evaluation - Final Report
- Region Construction or Traffic Office and Public Information Officer (Traffic Engineer or Work Zone Traffic Control Specialist)
- State Traffic Office (Traffic Specialist or Traffic Control Engineer)

1-2.4 Application of Contract Provisions, Plans, and Specifications

1-2.4A Construction Contracts Information System (CCIS)

The CCIS system is a mainframe application designed to track contract information and generate reports for all WSDOT administered construction projects. The initial setup of contract information into CCIS is done automatically by using information in the CAPS system. However, after the initial setup, the project offices must enter the majority of the contract information into the CCIS system. The data entered is then maintained and stored on the mainframe.

Among other things, CCIS generates the Weekly Statement of Working Days and Change Orders, and tracks this information. The system creates the forms for these reports so a preprinted form is not needed. Following is a list of data that needs to be entered into the CCIS database over the life of the project:

A. Contract Information

This part of CCIS will contain general contract information.

Region administering contract

Region the contract is located in

Regional Administrator

Operations Engineer

Project Engineer/PE Org code

Begin and End mile post

County

Prime Contractor's local address, if applicable

Prime Contractor contact person

Prime Contractor D/M/WBE type if applicable

Prime Contractor ethnic code if applicable

Date of Statement of Intent to Pay Wages - Prime

Date of Contractor and Subcontractor/Agent Cert. for F.A. Projects

Date of Affidavit of Wages Paid - Prime

Date of Preconstruction Meeting Minutes

Date time started

Date work started

Date Orig. Progress Schedule approved

Date Last Supplemental Progress Schedule approved (if applicable)

Date of Substantial Completion (if no Substantial Completion granted, use Physical Completion date)

Date of Physical Completion

Final Estimate to Contractor

Date of Completion

Final Estimate to Headquarters (filled in by Region office)

Contract time – Original Authorized Working Days

B. Contractor Information

This part of CCIS tracks information about Request to Sublet and Affidavits of Amounts Paid.

Request to Sublet

Affidavit of Amounts Paid

C. ECR Tracking

This part of CCIS tracks the Contractor's training program, trainees, and MWDBE reviews

Training Program

Apprentice/Trainee Approval Request

DMWBE and EEO reviews

D. Change Orders

Change orders are created, printed and tracked in this part of CCIS. It is very important to keep the information current to facilitate correct tracking and reporting.

Approval (to proceed when granted)

Date sent to Contractor

Date received from Contractor

Is there Surety consent

Date of Surety consent

Dates of approval and execution *Note: Line 4 "Date Executed" should only be used by Region or HQ.*

Change Order Voided (if applicable)

Avoidable/Unavoidable

Value Added

Note: the change order will not be completed until Avoidable/Unavoidable and Value Added are completed.

E. *Weekly Statement of Working Days*

The “*Weekly Statement of Working Days*” is a report generated by CCIS, based on information entered into the system by the project office. This report details the number of workable/unworkable days charged to a project, the reason a day is charged as unworkable, daily weather codes, the current status of contract days, and a summary of the week’s construction activity. The Project Engineer must ensure that the appropriate information is entered into CCIS on a weekly basis, a “*Weekly Statement of Working Days*” is generated, and a copy of the report is sent to the Contractor. Weekly statements shall cease when physical completion is granted, or when substantial completion is granted and all working days are expended.

Refer to the *CCIS Manual* for details on using the system.

1-2.4B Order Lists

Contract language requiring an order list can be found in Section 6-05.3(2), which addresses piling other than cast in place concrete and steel piles, and in Section 8-21.3(1), which addresses the determination of lengths of wood and steel sign posts. In other types of work, such as drainage, guardrail, etc., the actual layout will often result in quantities and lengths that vary from the plan estimates. A project engineer could choose to communicate this information in several ways, one of which could be the development of a formal order list. If an order list is used, extra care should be taken to ensure its accuracy. An alternate method of notice could also be a walk through with the contractor representative after staking.

1-2.4C Changes in the Work

• INTRODUCTION

WSDOT reserves the right, under *Standard Specifications* 1-04.4, to make changes to the work, work methods, working days, or quantities, as necessary to satisfactorily complete the project as originally intended.

Adding work beyond the original scope is, in essence, entering into a contract to perform work without the benefit of a competitive bid. There is a statutory (RCW 47.28.050) exception from the competitive bid requirement for work up to a value of \$7,500. If the value of the work is in excess of \$7,500 it is necessary to go through the competitive bidding process.

Change order work may impact the design criteria used to develop the project. The Project Engineer must be alert to this, and ensure that the Design Documentation Package is revised to reflect any such changes. The Project Engineer must contact the Region Project Development staff to obtain approval for the change, and for guidance in documenting and incorporating the change into the Design Documentation Package.

1-2.4C(1) Types of Changes

There are several categories of changes that may occur during the course of the work. A change may warrant additional payment to the contractor or a credit for the contracting agency. A change may also warrant an increase or decrease in the working days. Every situation is different. The *Standard Specifications* are very specific on what additional costs are eligible for adjustment. The balance of this discussion of types of changes is intended to help describe and explain the various categories of changes.

(I) VARIATIONS FROM ORIGINAL BID QUANTITIES

Contracts are set up with estimated quantities. Contractors provide unit prices and actual measured quantities are paid using those unit prices. What happens when the actual measured quantity varies from the estimated proposal quantity? the WSDOT *Standard Specifications* (Section 1-04.6) require that variations of less than 25% be performed without changes in the bid price, but that variations greater than 25% may qualify for a payment adjustment of the contract bid. This distribution of estimating risk is a policy of WSDOT and is also a Federal requirement for any project with Federal funds.

Variations may occur because field conditions cause a different quantity for the planned work than was envisioned during the estimating. Other variations may occur when work is added or deleted by change order and original contract unit items are included as the method of pricing the change order. Finally, quantity variations occur when work is added, deleted or revised without a formal change order (constructive change) and units with unit prices are the only measure of the revision. The work represented by a constructive change order is in fact work not anticipated at the time the contract was bid and executed, and as such would be outside of the requirements of *Standard Specifications* Section 1-04.6. In other words, you cannot deny a payment adjustment based solely on the fact that the accepted quantity of a bid item is within 25% of the original proposal quantity.

As discussed below, quantities included in formal change orders are excluded from consideration of quantity variations. The project engineer who allows constructive changes without formal documentation may find an additional negotiation waiting when final adjusted quantities are calculated and compared with the original proposal quantity.

A unit bid price consists of four different parts. First, and most obvious, are the costs of labor, equipment, materials and services needed to accomplish the work. These are the “direct costs” involved and they vary directly with the amount of work. Second are the variable overhead costs, such as field supervision, field support items (phones, computer rental, payroll clerks, sanicans, etc) whose amounts will vary along with the direct costs. Third, and more difficult to assess, are unavoidable, distributed, fixed overhead costs. These are typically long term and exist whether the quantity varies or not. They include things like home office costs, field trailer setup, long term equipment rentals and other fixed costs. These are typically distributed to the project by allocating them to the plan quantity. Fourth, and finally, the unit price will include some amount for profit.

[1] Section 1-04.6

The standard contract provision calls for the calculation of an adjusted final quantity. This is the method of revising the final measured quantity to allow for proposal item quantities included in agreed change orders. Unit prices as originally bid will be utilized if the adjusted final quantity is more than 75% of the original proposal quantity and not more than 25% greater than the original proposal quantity.

If the final adjusted quantity is outside these limits, then either party to the contract may initiate a renegotiation. If neither party does so, then unit prices will apply to the entire measured quantity of the item. Neither of these actions would be a change to the contract, as the provisions already allow a price change. A formal change order document might well be initiated to show the agreement, however, and would be the mechanism to create new prices.

If a negotiation is initiated, the provision calls for a new price for the quantity in excess of the 25% overrun or a contract price adjustment to compensate for costs and losses associated with an excessive underrun. The renegotiated price for the overrun portion is not an equitable adjustment and this is an important distinction. The new price is based upon actual costs experienced and is completely unrelated to the old bid price. The typical discussion about “what’s different from the bid work and what number should be used to modify the bid price?” does not apply in this type of negotiation. The underrun compensation is an equitable adjustment, however, and much of the negotiation is related to the bid price and discussions of the actual work costs as opposed to the planned costs.

Other features of the provision include an exclusion of force account items and other items where an amount has been entered solely to provide a common proposal for the bidders. Consequential damages and lost profits are specifically excluded. The effect of any unbalanced allocation of overhead costs is also excluded from compensation under the provision.

Force accounts and calculated quantities are already taking actual costs into account for overruns. Because of the nature of these items, contractors are unable to allocate unavoidable fixed costs to them except as a share of the allowed markup. The contractor is aware of this provision at the time of bid and knows that this item will not be eligible for renegotiation in the case of an underrun.

Consequential damages are those which are separated from the project and which might be presented as part of a negotiation. “Because of your overrun, I was unable to start work on my other project and had to do that other work in the wintertime.” This *consequence* of the quantity variation is not compensable because of the wording of the provision. Similarly, the profit that the contractor might have made on some other work but for the need to perform the extra work in an overrun is also not compensable.

Unbalanced bidding might result in a significantly higher or lower price for an item than normal. It means that too much or too little of allocated overhead or other costs is assigned to the item. This is not a problem in a low bid situation when all items come in at plan quantity. The problem would arise

if an unbalanced item were to be involved in an excessive underrun. This provision allows the project engineer to evaluate this possibility during an underrun negotiation (remember that the overrun pricing takes care of the problem automatically by assessing cost and ignoring the bid price.)

Contract time may be affected by the first unit of overrun or underrun. It may be appropriate to add or delete working days; depending on how the quantity variation affects critical activities, as shown on the Contractor’s approved progress schedule.

[2] Negotiation Guidelines

{a} Adjusted Final Quantity the Standard Specification language is quite clear on this subject. Start with the final measured quantity, the number that would be included in the final estimate for the item. Review all change orders that have been approved and have been accepted by the Contractor (see Section 1-04.5 for a definition of contractor acceptance of change orders.) Identify change order increases in the item and subtract these from the final measured quantity. Identify change order decreases in the item and add these to the result of the previous subtraction. The result of these calculations is defined as the Adjusted Final Quantity.

Compare the Adjusted Final Quantity to the original proposal quantity. If the Adjusted Final Quantity is greater than 1.25 times the original proposal quantity, then the item is eligible for an overrun renegotiation. If the Adjusted Final Quantity is less than 0.75 times the original proposal quantity, then the item is eligible for negotiation of an equitable adjustment due to underrun.

{b} Renegotiation for Overruns the first analysis should be to determine, if possible, where and when the overrun took place. This is not necessarily the work done after the quantity of 1.25 times proposal was reached. In many cases, a review of the work will disclose which part of the project actually experienced the low estimate and the resulting extra quantity. This is more common in physical items that are visible and can be measured by weight or physical dimensions (Roadway Excavation, Culvert Pipe, Select Borrow, etc.) These are often detailed in the plans to the extent that actual work can be compared with the relevant portion of the proposal quantity. When actual overrun work can be identified and when records exist showing the resources utilized for that work, then those records can form the basis for the revised payment amount. In other cases, the item is a support function, often measured by time, where the plan segments cannot be separated for analysis. This is common in Flagging, Pollution Control items, etc. To analyze these, the only choice is often to look at the actual work that occurred after the threshold was reached and price it. A third method, where records are adequate, is to evaluate the actual costs for the entire item, and apply those only to the overrun units.

Regardless of method of determining direct cost, markups will be allowed. A good place to start would be the force account percentages described in Section 1-09.6. If the contractor is providing other records for overhead and profit, these can be used, if they are reasonable. Any overhead items that are unavoidable, distributed fixed costs should be excluded. Remember that the Contractor has already been compensated for these one and a quarter times over.

The revised price will apply only to the units measured in excess of 1.25 times the original proposal quantity. The overrun units between the proposal quantity and the threshold will be paid, according to the terms of the contract, at the bid price.

{c} **Equitable Adjustment for Underruns** the adjustment for an underrun is limited by the contract terms to three factors. The first of these is an adjustment for any increase or decrease in direct costs that result solely from the reduction in quantity. The most common example of this type of cost is the learning curve. "By the time my crew learned how to do this work at this site with these specifications, we were done. They should have been able to apply these skills to an additional 30, 40 or 50 percent of the plan quantity. I experienced the least efficient units and missed out on the most efficient." in negotiation, this might be demonstrated by production rates, by inspectors' reports or by the agreed judgment of the negotiators. If such a condition did exist, then an agreed amount for inefficiency during the learning curve could be included in the adjustment.

The second factor has to do with the nature of the work actually done, when compared with the work shown in the plans. The most common manifestation of this is "You deleted the easiest units and left me with the most difficult," or "You added units that were much more difficult than those shown in the plan." Compensable, if true. Logic dictates that, if all of the work shown in the plans was performed and, if no work was added except by formal change order, then this factor can have no value. The work that was performed was what was shown in the plans and was what the Contractor bid. If, on the other hand, the project engineer has allowed constructive changes without formal documentation, then this factor could well come into play.

Finally, the negotiation should include a look at reallocation of undistributed unavoidable fixed overhead costs. The contractor has allocated these to 100% of the proposal amount. The bid price is firm as long as 75% of the units are measured and paid. If the final adjusted quantity is less than 75%, then the anticipated contribution of the units not performed (up to 75%) can be identified, negotiated and included in the equitable adjustment.

One final aspect of underruns: There is a reality that, if more units were paid up to the 75% threshold, then there would be no eligibility for negotiation. Because of this, there is a limit to the equitable adjustment. The total paid for the item, including units actually performed and the equitable adjustment cannot exceed 75% of the original proposal quantity, multiplied by the unit bid price.

(II) *DELETION of ITEMS*

[1] **AUTHORITY to DELETE** As provided in Sections 1-04.4 and 1-08.10(2) of the *Standard Specifications*, WSDOT may cancel all or portions of work included in a contract. When deleting work that is condition of award (COA), be sure to also delete that work from the COA requirements by completing the condition of award portion of the change order in CCIS. An adjustment in working days may also be appropriate.

[2] **PAYMENT FOR REMAINING WORK** There are some limitations to payment that should be noted under *Standard Specification* 1-09.5. When work is decreased or deleted by the contracting agency, payment will only be for the costs actually incurred for partially completed work. No profit will be allowed for work that was not completed. Consequential damages are also not allowed. Consequential damages may include such things as: loss of credit, loss of bonding capacity, loss of other jobs, loss of business reputation, loss of job opportunities, etc. In the case of a portion of a lump sum item or partially completed unit items, the value of this work will need to be determined. It may also be necessary to negotiate a price adjustment for the work that was performed and paid using a contract unit price if there is a material difference in the nature of the accomplished work when compared to the nature of the overall planned work. Under certain circumstances when the contractor says "you eliminated all the easy work and left the difficult," there may be entitlement to an adjustment.

In the event that the deletion impacts the critical path for the project, an adjustment in working days may also be appropriate.

[3] **PAYMENT FOR MATERIALS** When work is deleted from the project and the contractor has already ordered acceptable materials for such work, Section 1-09.5 of the *Standard Specifications* controls.

{a} *contractor restocks* the first and best method for disposing of the materials is to request that the contractor attempt to return the materials to the supplier at cost or subject to a reasonable restocking charge. If the materials are restocked then, in accordance with Section 1-09 of the *Standard Specifications*, the contractor's actual costs incurred in handling the materials may be paid.

{b} *contractor purchases* If WSDOT cannot utilize the materials, the contractor may elect to retain them for other work. Once again, in accordance with Section 1-09 of the *Standard Specifications*, the contractor's actual costs incurred to handle the materials may be paid.

{c} *state purchases and disposes* As a last resort, if the materials can not be disposed of at a reasonable cost to WSDOT, the Department may choose to purchase the materials from the contractor. There are some limitations that come with the use of federal funds that may require that the materials be purchased with state funds depending on the situation. The State construction office may be contacted for advice. If possible, such materials may be provided to a future contractor (work with Design) or to Maintenance (work with the Regional Maintenance Office). If the materials cannot be used, they shall be disposed of as described in the manual for *Disposal of Personal Property* (M 72-91). Once again, in accordance with Section 1-09 of the *Standard Specifications*, the contractor's actual costs incurred in handling the materials may be paid.

(III) CONTRACT MODIFICATIONS

Changes in Materials, Work Method, or Work Sequence may or may not be a change to the contract. The determining factor is if the change is a modification of a specific contract requirement. If the contract includes language such as “recommends”, “suggested”, or “approved equal” associated with the item or allows the engineer to approve changes, then a change order is probably not required. In essence, this would not be a violation of the contract and therefore, does not require a change to the contract. A common situation is when the contractor proposes a change to a submitted manufacturer’s recommendation, drawing or plan such as a falsework drawing or erection plan. Changes to those drawings/plans may be made by the same authority that approved them the first time. Once again, it is not a change to the contract.

(IV) COST REDUCTION INCENTIVE PROPOSAL (CRIP)

It is the policy of WSDOT to encourage our contractors to be innovative in planning and performing the work when a cost savings can be realized. When a contractor identifies such a savings and provides a significant portion of the efforts needed to develop the proposal, then WSDOT will share the resulting savings with the contractor. This policy is carried out through change orders containing Cost Reduction Incentive Payments. The Project Engineer should encourage CRIPs and seriously consider the mutual benefits of these proposals brought forth by the contractor as a partner in the contract.

[1] IS IT A CHANGE/CRIP? A proposal may include material and/or product substitutions, work method changes, work sequencing changes, etc., that normally take place during the construction of a project. Contractor proposals do not require change orders nor qualify as CRIPs when the change does not require modification of the contract. See the previous section “contract modifications”.

[2] AGENCY CREDIT OR NO COST CHANGES (NOT A CRIP) the contracting agency is not obligated to accept a proposal which is not equivalent or superior to what is required by contract. However, if a contractor proposed change is acceptable and desirable to WSDOT, but is not equivalent or superior to what is specified by contract, then a credit should be considered as part of the change order. This type of change would not be considered a CRIP. The credit required would normally be 100 percent of the cost or time savings. If it is determined that contract time is not affected and that the cost differential is negligible or to the state’s advantage, then the change might require a “no cost” change order. If, in the opinion of the evaluator, the State is not harmed and there is no windfall savings for the contractor, then a no-cost change would be appropriate.

[3] IDENTIFYING A TRUE CRIP

A CRIP might exist if:

- the change is the contractor’s idea
- it offers, in effect, the same end result as what is specified in the contract
- savings will be achieved in dollars or time by its implementation

Qualifying actions by the contractor:

- accepts design risk of temporary features
- accepts risk of constructability
- makes a significant effort to develop the proposal
- employs an engineer to assist in development (indicator, but not required)
- prepares all documentation, presentations, and plans
- invests an appreciable amount of time

[4] DEVELOPMENT OF CRIPs Once a CRIP is identified and developed to the point of conceptual approval, it is treated in nearly the same manner as any other change order. There are some differences, such as the contractor’s responsibility for preparing the documents, and there is a special method of calculating the incentive payment amount. In the interest of uniformity, the following guidelines are to be used for the evaluation of CRIPs submitted by the contractor:

General Requirements and Principles Applying to CRIPs:

- The proposed change must alter a contract requirement.
- The proposed change must result in a product that meets the intent of the original design.
- In the judgment of the evaluator, the ultimate life cycle costs to WSDOT shall not be unduly increased.
- The contractor agrees to substitute for deleted condition of award COA work.

Additional Requirements for Time Reduction CRIPs:

- The time saving is a direct result of an actual change in the design or method of work (simply adding more crews would not qualify as a CRIP).
- The original time for completion was realistic (an early finish of a job with an unnecessarily long time for completion would not be a CRIP).
- The project does not already have an incentive/disincentive clause (in that case, the cost of accelerating the completion is assumed to be included in the bid and a CRIP sharing of the cost is inappropriate).

{a} **Step 1:** *concept approval* the first effort in development of a CRIP shall be to achieve concept approval. To this end, the contractor shall submit a written proposal to the Engineer for consideration. The proposal shall contain the following information:

- An explanation outlining the purpose of the change(s).
- A narrative description of the proposed change(s). If applicable, the discussion shall include a demonstration of functional equivalency or a description of how the proposal meets the original intent of the design.
- A cost discussion estimating any net savings. Savings estimates will generally follow the outline below under “Calculating the Incentive Payment”.

- A statement providing WSDOT with the right to use all or any part of the proposal on future projects without further obligation or compensation.
- A statement acknowledging and agreeing that the Engineer's decision to accept or reject all or part of the proposal is final and not subject to arbitration under the arbitration clause or otherwise be subject to claims or disputes.
- A statement giving the dates the Engineer must make a decision to accept or reject the conceptual proposal, the date that approval to proceed must be received, and the date the work must begin in order to not delay the contract.

A separate copy may be sent to the Headquarters Construction Office to initiate tracking of the progress of the proposal. After review of the proposal, the Engineer will respond in writing with acceptance or rejection of the concept. This acceptance shall not be construed as authority to proceed with any changed contract work. Depending on the nature of the proposal, the review could include Region and Headquarters designers and, possibly, outside consultants. The completeness and quality of the proposal will have an effect on the time needed for the review. WSDOT will make every effort to expedite the review.

{b} **Step 2: formal approval** Concept approval allows the contractor to proceed with the work needed to develop the final plans and other information to support the ultimate preparation of a change order. To qualify for an incentive payment, the contractor will normally take the lead in the development effort. The Project Engineer is encouraged to provide whatever assistance is needed. The development of a CRIP is an example of partnering at work in a contract. The contractor's submittal shall provide the Project Engineer with the following:

- Deleted Work — Calculated quantities of unit price work to be deleted. Proposed partial prices for portions of lump sum work to be deleted. Time and material estimates for deleted work in force account items.
- Added Work — Calculated quantities of unit price work to be added, either by original unit contract prices or by new, negotiated unit prices. Proposed prices for all new items to be negotiated.
- Contractor's Engineering — Costs of engineering to develop the proposal shall be submitted. Costs of employees utilized in contract operations on a regular basis will not be included.
- Schedule Analysis — If the CRIP is related to time savings, a partial progress schedule showing the changed work. A discussion comparing this schedule with the approved progress schedule for the project.
- Plans and Working Drawings — All drawings and supporting calculations necessary to accomplish the work. Those drawings which include engineering calculations and features shall be prepared by a professional engineer licensed in the State of Washington and shall bear the professional engineer's signature and seal.

{c} **Step 3: Preparing and approving the change order** the change order itself shall be prepared and processed in the same manner as any other change order.

Calculating the Incentive Payment in the interest of uniformity, all CRIP change orders shall include separate payment items as follows:

- Any deleted work, whether at contract prices or at agreed prices.
- Any added work, whether at contract prices or at agreed prices.
- The contractor's engineering costs, reimbursed at 100 percent of the contractor's cost.*
- The incentive payment to the contractor.*

*Where added work exceeds deleted work, but time savings make a viable proposal, these two items would be replaced by:

- WSDOT's share of added cost to achieve time savings.
- The contractor's share of savings from deleted work.

The final sum of these shall ordinarily be the savings to WSDOT. However, in some cases, savings may be offset by any increased inspection and administration costs, or augmented by intangible benefits, such as user benefits, or by indirect benefits, such as overhead and engineering savings in time reductions, or by theoretical savings, such as a CRIP that eliminates a large anticipated overrun in plan quantity. In these cases, the benefits would not be expressly reflected in the change document, but should be discussed in the justification letter.

Proposal Savings: The incentive payment shall be one-half of the net savings of the proposal calculated as follows:

$$\begin{aligned} &(\text{gross cost of deleted work}) - (\text{gross cost of added work}) = \\ &(\text{gross savings}) \\ &(\text{gross savings}) - (\text{contractor's engr. costs}) - (\text{WSDOT's engr. costs}) = (\text{net savings}) \\ &(\text{net savings})/2 = (\text{incentive pay}) \end{aligned}$$

WSDOT's engineering cost shall be actual consultant costs billed to WSDOT and extraordinary in-house personnel labor costs. Project personnel assigned to the field office or who work on the project on a regular basis shall not be included.

Cost to Achieve Time Savings:

$$(\text{cost of added work}) + (\text{contractor's engineering costs}) = (\text{cost to achieve time savings})$$

$$(\text{cost to achieve time savings})/2 = (\text{WSDOT's Share of Added Cost})$$

If the timesaving proposal also involves deleting some work and, as a result, creates a savings for WSDOT, then the contractor would also receive one-half of the savings realized through the deletion.

{d} *Authority to Proceed with Changed Work* the need may arise to proceed with changed work before the change order is executed. WSDOT is willing to provide an approval, allowing the work to proceed, if the following criteria has been met:

- Concept approval has been granted.
- The necessary design reviews and approvals have been completed, including plans and specifications.
- The contractor has guaranteed, in writing, the minimum savings to WSDOT.

Such advance approval, if given, shall be in writing and shall constitute commitment by WSDOT to ultimate formal approval of the proposal. Where appropriate, the advance approval may contain a narrative formula of the elements to be utilized in the final cost negotiations. When work has begun under such an approval, detailed records shall be kept of the labor, equipment, and materials utilized and, if ultimate approval is not gained soon enough to provide prompt payment for the work, then an interim change shall be executed to allow partial payments.

{e} *Problems Arising After the Agreement* the contractor assumes the risk of constructability. However, there will occasionally be problems that arise while the work of the CRIP is being performed. These will be evaluated on a case-by-case basis. The controlling philosophy will be that we entered the CRIP as a team with the contractor and we will approach problems in a similar vein. If the problem is something that could not reasonably have been anticipated in the design work of the CRIP, then the risk shall be shared as will the cost of the solution.

{f} *Proposed CRIP is not accepted* If the evaluator decides to reject a CRIP proposal, the contractor will be notified in writing with an explanation. Copies of this notice, with an attached analysis of evaluation costs and any other factors, shall be provided to the Region Construction Manager and the Headquarters Construction Office.

1-2.4C(2) *Equitable Adjustment*

(I) *PRICING*

Section 1-04.4 of the *Standard Specifications* specifies that an equitable adjustment (EA) in accordance with Section 1-09.4 will be made when changes cause an increase or decrease in the cost of performing work on the contract. The basic theory of an EA is to leave the parties to the contract in the same position cost wise and profit wise as they would have been without the change, preserving to each as nearly as possible the advantages and disadvantages of their agreement. Although the contractor is entitled to profit on the changed work, the profit (or loss) on the unchanged work should remain unaffected by the equitable adjustment.

- This is an important point, *for unchanged work*, the contractor is entitled to the profit bid or a windfall, if the work turns out to be easier than expected.
- On the other hand, *for unchanged work*, the contracting agency is not obligated to make the contractor well for an under bid item.

Consequential damages are never allowed as part of a negotiated equitable adjustment. Consequential damages may include such things as: loss of credit, loss of bonding capacity, loss of other jobs, loss of business reputation, loss of job opportunities, impacts to another project, etc.

[1] **UNIT PRICES** An appropriate price may be

established using average unit bid prices, citing similar unit bid prices, a determination of market value, by estimating the cost to perform the work, or a combination of these methods. Unit bid price is one indication of an equitable price, however the contracting agency should be prepared to support the price by other means.

[2] **FORCE ACCOUNT** When added work is paid by force account, a change order shall be prepared detailing the added work to be performed and the estimated cost. Standard Item Number 7715 is to be used for all force account items that do not have an assigned standard item number. Force account should be a last resort used only if the work can't be clearly defined.

[3] **OVERHEAD** There are two basic types of overhead as follows:

- **DISTRIBUTED FIXED COSTS:** Offsite "home office overhead" is the cost of running a company. These costs are assumed to be distributed among all the projects performed by the company. Onsite overhead is incurred as a function of time needed to accomplish the project. Onsite costs are assumed to be evenly distributed among contract items. This category of overhead is eligible under an equitable adjustment if working days are added to the contract as part of the adjustment.
- **VARIABLE FIXED COSTS:** these costs are directly associated with performing an item of work on the project and therefore vary with the quantity, the contractor is entitled to recover these costs as a part of an equitable adjustment.

(II) *FORWARD PRICING AND RISK*

The first and best option for an equitable adjustment is agreement in advance between the contractor and WSDOT on the increased or decreased cost and time for performance of the changed work. The Project Engineer should expend every effort possible to obtain a satisfactory negotiated equitable adjustment prior to submitting the change order to the contractor for endorsement. The Project Engineer must remember that the contractor is a full participant in the contract and retains all the rights and privileges during a negotiation. When bidding a job, the contractor must be optimistic and take appropriate risks. When negotiating, it is understandable and acceptable for the contractor to be pessimistic and avoid risk, unless compensated. Some key points to remember are:

CHANGE ORDER — CHECKLIST

Contract # _____ Contract Title: _____ Change Order #: _____	Included?		If Yes, Approval Required		
	YES	NO	PE	Region	State Const.
I. Executed by the State Construction Office					
1. A cost or credit equal to or exceeding \$200,000.*1	<input type="radio"/>	<input type="radio"/>	X	X	X
2. A change in the contract documents beyond the scope, intent, or termini of the original contract.*2	<input type="radio"/>	<input type="radio"/>	X	X	X
3. Any proposed revision or deletion of work that effects the condition of award requirements.	<input type="radio"/>	<input type="radio"/>	X	X	X
II. Executed by the Region					
4. A cost or credit greater than \$50,000 but less than \$200,000.	<input type="radio"/>	<input type="radio"/>	X	X	
5. A change in contract time greater than 10 and less than or equal to 30 working days must be related to changes implemented by change order.	<input type="radio"/>	<input type="radio"/>	X	X	
6. A change in contract time greater than 30 working days or a change in contract time unrelated to any change order.	<input type="radio"/>	<input type="radio"/>	X	X	X
III. Executed by the PE					
7. A determination of impacts and/or overhead.	<input type="radio"/>	<input type="radio"/>	X	X	X
8. Specification change, involving Headquarters generated specifications.	<input type="radio"/>	<input type="radio"/>	X	X	X
9. Specification change, involving Region generated specifications.	<input type="radio"/>	<input type="radio"/>	X	X	
10. Material or product substitution. (Requires State Materials Lab Recommendation & HQ Const. approval)	<input type="radio"/>	<input type="radio"/>	X	X	X
11. A structural design change in the roadway section. (Requires State Materials Lab approval)	<input type="radio"/>	<input type="radio"/>	X	X	
12. A determination of changed condition.	<input type="radio"/>	<input type="radio"/>	X	X	X
13. Settlement of a claim submitted under Section 1-09.11(2).	<input type="radio"/>	<input type="radio"/>	X	X	X
14. Repair of damage qualifying under Section 1-07.13 of the <i>Standard Specifications</i> regarding "acts of God" or "acts of the public enemy or of government authorities".	<input type="radio"/>	<input type="radio"/>	X	X	X
15. A structural change for structures (see BTA authority as shown in the Construction Manual.	<input type="radio"/>	<input type="radio"/>	X	X	X

Approval to proceed:

This is approval given by the executing authority (Headquarters, the Region, or the Project Engineer) to proceed with work prior to issuance of the written change order. This approval is warranted on any change where a cost/time benefit to WSDOT can be realized or a cost/time disadvantage to the contractor can be minimized by prompt action.

Fill in applicable Approval to proceed name and dates, if any:

PE: _____ Date: _____
 Region: _____ Date: _____
 State Const. Office: _____ Date: _____
 Other: _____ Date: _____

To be completed by Project Engineer:

Avoidable: Yes _____ No _____ Value Added: \$ _____

Change order prepared by: _____ Date: _____

Change order reviewed by: _____ Date: _____

CO Reason (s) (see CCIS Source/Outcome codes or Const. Homepage): _____

To be completed by Region:

Is the change eligible for Federal participation where applicable? Yes _____ No _____

*1 Change greater than \$200,000 on Federal Stewardship requires FHWA approval (see Ch. 1-2.4C(3) and Ch. 1-3.4).
 *2 Per RCW 47.28.050, any change beyond \$7,500 that is beyond the original scope shall go through the competitive bidding process.

Figure 1-5

- A negotiated price will likely be higher than a competitive bid price.
- A proposal which assigns extensive risk to the contractor will likely be more costly yet.
- The contractor may be willing to take on this risk if the price is a bit higher
- The significant advantage of reaching a price agreement before the work is started (forward pricing) is that the contractor assumes the risk of the accuracy of the pricing assumptions and predicted duration for performing the work.
- (when forward pricing) the Project Engineer may utilize the high end of the estimating range in justification.
- (when forward pricing) an audited overhead rate may be substituted for the markups described in Section 1-09.6. Contractors can usually provide an estimated home office overhead rate which may be checked by an annual audit, if warranted.

(III) PRICING AFTER FACT

When establishing prices after the work has been performed, actual costs should be used to the extent they are available. The following are key points to keep in mind:

- Costs for equipment cannot exceed the rates established by the AGC/WSDOT *Equipment Rental Agreement* for an equitable adjustment.
- When pricing after the fact, the markups described in Section 1-09.6 are appropriate for measuring time and materials because there is no risk involved in after the fact pricing.

(IV) UNILATERAL PRICING

In the interest of being timely, the change order should be a tool to document agreement and not a negotiation tool back and forth. Ideally we will have agreement with the contractor when pricing the work. On occasion, however, due to time constraints and difference of opinion, we can't always come to agreement. The difference of opinion may be for only a small portion of the work. *Standard Specification* 1-09.4 (2) provides, "If the parties can not agree, the price will be determined by the Engineer using unit prices, or other means to establish costs". This is not to say that the contractor is obligated to honor unit bid prices for work that qualifies for an equitable adjustment. This allows us to proceed with changed work prior to reaching an agreement on the price. In the interest of being timely, and provided the Project Engineer is comfortable that the included price can be supported, there's nothing wrong with issuing a change order to the contractor unilaterally. This orders the work to proceed, establishes the State's position on cost, and puts the decision to continue negotiations in the contractor's hands as detailed under 1-04.5. The contractor is obligated to endorse, write a separate acceptance, or protest as described in the specification and a timeline is provided for these actions.

(V) TIME

The completed equitable adjustment should include provisions for any increases or decreases in contract time based on impacts to overall contract duration. The decision on time should be supported by an analysis of the project schedule. Analyzing time in advance encourages communication between the parties allowing the contracting agency to make an informed decision on the true costs. It also enables the contracting agency to mitigate time impacts if that is in the agency's best interest.

1-2.4C(3) Approval of Changes/Checklist

In addition to noting who can execute a change order, the checklist (see Figure 1-5) further indicates who must approve the change prior to execution. The completed checklist shall accompany the change order when it is transmitted to Headquarters, and represents the minimum information required to process the change order. If the Region wishes to supplement the checklist, they may do so on a separate sheet. Written approval constitutes agreeing with the general nature of the change and can be granted by memorandum or e-mail. The checklist works as follows: for any item marked "yes", approval must be obtained as indicated by the columns with the "Xs". Each tier, left to right, has the authority to decide not to proceed with the change. This approval does not constitute authority to proceed with the work. That authority must come from the person who will execute the change order (*see verbal approval.*) in an emergency; the Region Construction Manager may authorize work to begin on any change order if the State Construction Office cannot be contacted for the required approvals within a reasonable amount of time.

(I) State CONSTRUCTION OFFICE

[1] FHWA APPROVAL on a project with federal funding and for which the stewardship responsibility has not been delegated, written FHWA approval, or verbal approval if the public interest is served by the more timely action, is required prior to beginning work on change orders that will:

- involve new construction on the Interstate
- alter the termini, character, or scope of work
- increase or decrease the project cost by more than \$200,000 (except for changes prepared in accordance with *Standard Specification* Section 1-04.6)

{a} *who does what?* the State Construction Office will formally submit this type of change order to FHWA for approval.

[2] CONSTRUCTION ENGINEER, ADMINISTRATION

{a} *areas of responsibility* Contract Payments and Withholding of Payments; Contractor Assignment of Payments; Contractor Default; Time Extensions; Assessment of Liquidated Damages; Contract D/M/WBE, EEO, and Training Programs (i.e., Division 1 of the *Standard Specifications*).

[3] CONSTRUCTION ENGINEER, BRIDGE

{a} areas of responsibility Bridges & Structures; Bridge Deck Overlays; Walls: (1) Standard and Nonstandard Reinforced Concrete, (2) Soldier Pile, Tieback, Slurry, Cylinder Pile; (3) Soil Nail Walls (i.e., Division 6 of the *Standard Specifications*).

[4] CONSTRUCTION ENGINEER, ROADWAY

{a} areas of responsibility Construction Engineer, Roadway—Grading, Paving, Miscellaneous Paving; Culverts and Drainage; Concrete Slope Protection; Bridge Approach Slabs; Lighting; Signing; Traffic Signals; Fencing; Rest Areas; Walls: (1) Gravity Walls—Masonry, (2) Gabion, Rock, and etc., Proprietary Walls—Structural Earth and Geotextile (i.e., Divisions 2, 3, 4, 5, 7, and 8 of the *Standard Specifications*).

[5] State MATERIALS LAB

{a} areas of responsibility as you will notice from the checklist, the lab plays two roles:

CHECKLIST ITEM #10 the Materials Lab advises whether an alternate material is capable of performing the same function as a required material. However, the State Construction Office makes the final approval based on application of the material, maintenance concerns, etc.

CHECKLIST ITEM #11 the State Materials Lab is the design approval authority for a structural change with regard to roadway sections. Once design approval is obtained, the Region may approve the change order.

[6] BRIDGE TECHNICAL ADVISOR (BTA)

{a} areas of responsibility the BTA is an on call advisor to the Project Engineer on issues related to structural design. The BTA's role is to act as a resource for the Project Engineer in answering questions relating to design, plan clarifications and "minor structural changes".

{b} assignment of BTA After the contract has been awarded, the Region may send a written request to the Bridge Design Engineer in the State Bridge and Structures Office for the assignment of a Bridge Technical Advisor (BTA).

{c} delegation of executing authority if BTA is assigned When a BTA has been assigned to the project, the Region may execute certain "minor structural" change orders provided: 1) the BTA's stamp and signature are on sheet one of the change order, or on a drawing that shows the change; or there is other written structural concurrence from the BTA; and 2) the magnitude of the change is within the Region's authority to execute. All other requirements of the change order checklist apply with the exception that for "minor structural" changes under item #15 the BTA's recommendation may substitute for the State Construction Office approval. A "minor structural" change is not easy to identify, therefore when in doubt, contact the State Construction Office for advice. Changes involving specifications, materials, work method changes, repairs and major design changes should be referred to the State Construction Office. The BTA would never become involved in contract administration issues such as payment, determining the existence of a change to the contract or

directing the contractor. These would be construction issues. Structural questions which require support analysis exceeding field capabilities or questions regarding geotechnical or hydraulics issues should be referred to the State Construction Office. Any redesign of significance will be managed through the State Construction Office.

{d} BTA duties the Region and the Construction Office have agreed that "minor structural" questions may be referred to the BTA. Those "minor structural" questions which can be resolved on site may be handled directly by the BTA. Documentation will be provided to the Project Engineer in support of the recommendations. The BTA also takes on the responsibility of keeping the Bridge and Structures Engineer advised of any changes, as appropriate.

{e} BTA guidelines Specific guidelines for the BTA's role on site are as follows:

- Be alert to the need for technical advice to the Project Engineer and be available and responsive to the Project Engineer's requests.
- Develop solutions in accordance with the best structural interest of the project.
- Recommendations should generally be made in writing to the Project Engineer and should include an assessment of the approximate cost of the change.
- Provide the Project Engineer with written documentation to support the recommendations for changes. The Project Engineer will consult with the State Construction Office, as appropriate.
- The BTA has the authority to approve and endorse the structural changes on behalf of the State Bridge and Structures Engineer.
- Keep a written record of activities and recommendations pertaining to the assigned project (project diary).
- Refer/leave contract administration issues to the Project Engineer.
- Conform to the field safety requirements of the Region and the contractor.
- Give the construction project priority but be prudent in the use of time and expenses charged to the project.

The above guides are not meant to be all inclusive, but are generally representative of the scope of services to be provided by the BTA. The BTA's immediate administrative support on site will be provided by the Project Engineer. The BTA's technical responsibility will be to the BTA's regular supervisor in Olympia. Overall determination and monitoring of the assignments will be made by the State Bridge and Structures Engineer.

{f} BTA summary in conclusion, it is the role of Bridge Technical Advisors to advise the project engineer in their area of expertise, which is structural design. The project engineer has the responsibility and authority to administer the contract. Therefore, when it comes to contract issues of payment, work methods, material substitution, etc., it will be the Project Engineer's responsibility to get the proper approval of those aspects of structural changes.

1-2.4C(4) Delegation of Execution Authority**(I) HIGHWAY CONSTRUCTION**

The Change Order Checklist (Figure 1-5), in addition to describing the approval requirements previously described, also outlines who has authority to execute a change order.

The State Construction Office executes the change order:

- if any one of 1, 2, or 3 is true (checklist item # 1, 2, or 3 is yes)

The Region (Regional Administrator or designee) may execute a change order provided:

- 1, 2 and 3 are not true of the change (checklist item # 1, 2, and 3 are no)

The Regional Administrator's authority to execute change orders may be:

- delegated to the Regional Construction Manager
- further delegated to the assistant to the Regional Construction Manager

The Region's (Regional Administrator or designee) authority to execute a change order may be delegated to the Project Engineer provided:

- items 1 through 6 are not true of the change (boxes 1 through 6 are marked no)

In the absence of the Project Engineer, the Project Engineer execution authority may be further subdelegated to the Assistant Project Engineer.

(II) WASHINGTON STATE FERRIES

The Director and CEO of Washington State Ferries

(WSF) is authorized to approve all changes for terminal construction projects and may consult the State

Construction Office for advice. This authority to execute change orders may be:

- Delegated to the Director of Terminal Engineering provided the change does not include a cost or credit exceeding \$200,000 nor does it change the condition of award requirements.
- Authority may be further delegated to the Manager of Terminal Maintenance and Construction provided the change does not exceed \$50,000 and does not include a time extension exceeding 10 days.
- In the absence of the Manager of Terminal Maintenance and Construction, that Manager's execution authority may be further subdelegated to the Assistant.

(III) LOCAL AGENCY PROJECTS

When the project being administered includes local agency participation, the project engineer should coordinate with the Regional Local Programs Engineer and the local agency to establish an approval process acceptable to all the parties. Any funding constraints and timelines for reviews and approvals should be established and specified in the contract, if appropriate.

1-2.4C(5) Verbal Approval

The best business practice is to have a signed change order in place prior to proceeding with the work. Verbal approvals should be the exception. A verbal approval might be warranted if it will provide a cost/time benefit to WSDOT or minimize a cost/time disadvantage to the contractor. In the event that the Project Engineer determines that it is in the State's best interest to proceed with the work prior to having a signed change order, the permission "verbal approval" of the executing authority to proceed with the change under these circumstances must be documented in the file. The executing authority is the person who will ultimately execute the change order. The project engineer must have either an executed change order or a verbal approval in place prior to proceeding with the work

1-2.4C(6) Documentation**(I) STATE CONSTRUCTION OFFICE ROLE**

The State Construction Office will review Region executed change orders and provide appropriate feedback. Four main areas the Construction Office will review are:

- whether the change is appropriate and there is entitlement
- determine compliance with the change order checklist
- check for existence of supporting documentation
- determine if eligibility for federal-aid participation has been addressed

(II) PROJECT FILES

[1] CCIS INPUT The Project Engineer shall ensure that the following information is input into CCIS accurately and in a timely manner:

- Page 1
 - Proposed By: C(Contractor), E(Engineer), or B(Both)
 - Order Date: Date change order entered into CCIS
 - Short Description: Descriptive title for change order
 - Change Reasons: Two-letter code (if a CRIP make sure IP is 1st code used)
- Page 2 – (Use only if approval to proceed is requested)
 - Approval Date: The date approval given
 - Requested By: Who requested approval
 - Approved By: Who gave approval
 - Estimated Amount: The estimated dollar amount of the change order
 - Narrative: Description of why approval is needed

- Page 4
 - Sent To Contr: The date the change order was sent to the contractor for signature/concurrence
 - Rec'd From Contr: The date the change order was returned from the contractor
 - Surety Consent: Was surety consent obtained
 - Surety Date: Date Surety consent obtained
 - PE Recom: Is PE recommending approval by Region or HQ
 - Exec: Initials of PE if executing change order
 - Date: Date that PE executed or recommended execution (Note: the date field on line 4 is for Region or HQ use only)
 - Avoidable Change: Is this an avoidable change order
 - Value Added By CO: Dollar value of the change
 - By Whom: Who voided change order (if applicable)
 - Date: Date change order was voided (if applicable)
- Page 5
 - Phase: Contract phase affected by change order (if days added/deleted)
 - Description: Phase description (if days added/deleted)
 - Net Change: Number of days added/deleted by change order
- Page 6
 - Description: Change order text (uploaded from MS Word)

If new items are created, contract items modified, or Condition of Award is modified by the change order, this information must be input into CCIS as well.

It is important that CCIS input be accurate and timely. CCIS is used by internal and external customers to monitor project changes and costs. Information on change orders (*including minor changes*) is readily accessible through a numbering process and must be adequate so that everyone involved will understand the need for the change. Some key items to remember are as follows:

- Is there a clear description of the work?
- Is the origin and purpose of the change being entered using at least two of the reasons listed in the system?
- Was there an order, other than a signed change order, by the engineer for the contractor to proceed?
- Is there a reference to any key documents in the change order file?

- Are any increases or decreases in contract time associated with the change order entered in the appropriate field enabling the *Weekly Statement of Working Days* to be automatically updated?
- For condition of award change orders, are the appropriate fields filled in to generate the change order and automatically update the condition of award items?
- Are any disclaimers included in the change order and are any agreed upon disclaimers included in the text?
- Are all the appropriate dates entered?

In order to process the change order, entries must be made in the appropriate CCIS fields concerning whether or not the change order was avoidable and the degree to which the change adds value to the transportation system. The following definitions shall be used for these purposes:

{a} avoidable A Change Order shall be considered as "Avoidable" if the cause is under WSDOT control* and if one or more of the following are true:

- The problem could have been discovered or anticipated with a review of known information or with a reasonable effort.
- It resulted from an engineering error or omission.
- The project could have been constructed according to the contract without the change.
- Reviews of Contractor submittals were delayed beyond specification requirements.

*(e.g.: Cause is not an Act of God, was not ordered by an outside agency, etc.)

{b} value added Whether or not the change order is considered "Avoidable", an element of a Change Order adds value as long as it is not compensating for rework or delay damages resulting from an error or omission and it meets one of the following:

- There is a positive benefit/cost ratio or an improved life cycle cost.
- Completion is accelerated to the benefit of the users.
- There is a benefit to the public or the environment.
- The change is needed to meet the defined or required design service level.
- Needs of outside stakeholders are met.
- Work zone safety is improved.

Value added through change orders will often appear as a "pay now or pay later" cost. It can be seen that, if the work had been included in the original plans, the bid would have been higher (pay now) by more or less the same amount as the negotiated change (pay later).

[2] Memorandum: The memorandum transmitting the change order and attachments should include an explanation in sufficient detail so that everyone involved will understand the need for the change, will see that the price is appropriate and that appropriate checks and consultations have been made. The following is a list of items to consider for inclusion in the transmittal when putting together a change order:

{a} describe the change

- what is required by contract?
- what is the change?
- how does it solve the problem?
- reason for entitlement/why is this not paid under the contract?
- is there time associated with the change?
- did the contractor concur/if not why?
- is FHWA participation appropriate?
- does the change affect COA?

{b} evolution of the change

- how did the change evolve?
- discussions with associated offices (maintenance, utilities, environmental, budget, design, etc.)
- alternatives considered
- BTA involvement
- design approval necessary
- COA substitutions authorized by State Construction Office
- approvals in accordance with the checklist/date

{c} payment

- any increase or decrease in cost
- how it was established (see equitable adjustment)
- force account must include estimate

{d} time

- does the change impact the critical path?
- how was any change in working days established?
- note if a change in contract time affects the amount of liquidated damages

{e} prior approval

- was the change order executed by the appropriate WSDOT authority prior to proceeding with the work?
- if not prior approval by whom and when

{f} attachments

- checklist
- documentation of approval to proceed
- any supporting documentation needed for understanding

[3] DISTRIBUTION

{a} Region-executed When the Region (PE or Region Construction Office) has executed a change, then copies should be sent to the contractor, the State Construction Office and the State Accounting Services Office, (if necessary, the State Accounting Services Office creates and coordinates new groups in “CAPS” and “TRAINS”) If the change order utilizes the “Minor Change” process, then copies of the single page document substitute for the transmittal and CCIS change order print out.

{b} Headquarters-executed If the change is executed at the State Construction Office, copies will be sent to the contractor, the Region, the State Accounting Services Office, (if necessary, the State Accounting Services Office creates new groups and/or items) and, if appropriate, to the State Bridge Office, Design and the Materials Lab.

{c} protecting the interest of the surety One area for the Project Engineer to watch is the interests of the bonding company. Consent of Surety should be required on any change order that expands the scope of the contract. It is also appropriate on any change of large value or risk. Failure to obtain consent of surety could weaken the State’s protection under the bond.

1-2.4C(7) Minor Changes

(I) OVERVIEW

All contracts will have a standard item for “Minor Changes”. This item will be established in every group as a calculated lump sum. Credits, debits, changes in working days and no cost changes may all be processed under the minor change method subject to the listed criteria.

(II) CRITERIA FOR USE

Keep in mind that although the change meets the criteria for using the minor change process, the Project Engineer may decide that this process is not appropriate. The use of this item is at the Region’s and the Project Engineer’s discretion. Also keep in mind that the limitations and approvals required by the change order checklist still apply as well as all other change order criteria not modified by this *Minor Changes* section. The Minor Changes process is limited to changes that satisfy all three of the following criteria:

- non-structural changes (checklist item #15 is no) and,
- the value of the change (credit or debit) is estimated at \$5,000 or less and,
- any change in working days not greater than ten days.

(III) ENDORSEMENT

In the interest of being timely, the change order should be a tool to document agreement and not a negotiation tool back and forth. The contractor's authorized signature on the change order is desirable but not mandatory. A phone call or a verbal agreement with the project superintendent may be appropriate if payment is to be made by "Minor Changes". This may be a good discussion item at preconstruction meetings. The Project Engineer should determine when the Contractor's signature is required based on when it is in the State's best interest to document agreement prior to proceeding with a change order. Some situations that may warrant the Contractor's signature are as follows:

- The contract includes substantial incentives.
- There are mutual benefits associated with the change.
- The change might include impacts to time or other work.
- The change is proposed by the contractor.
- The change is a claim settlement.

In any case, a copy of the Minor Change must be sent to the contractor. If the contractor does not agree with the terms or conditions of any change order and has not endorsed the change, then the contractor is required to follow the procedure outlined in Section 1-04.5 of the *Standard Specifications*. This orders the work to proceed and puts the decision to continue negotiations in the contractor's hands as detailed in that section. The contractor is obligated to endorse, write a separate acceptance or protest as described in the specification, and a timeline is provided for these actions.

(IV) EXECUTION

Due to the criteria for the application of minor changes, the Project Engineer has the authority to execute these change orders.

(V) PAYMENT BY LUMP SUM

The negotiation of prices for payment under "Minor Changes" is intended to be the same as any other change order. The focus, as always, should be forward pricing such that the contractor controls the work and assumes the risk. However, situations occur where it makes sense to measure portions of the work in a variety of ways such as units, force account and/or lump sum. The method for establishing, measuring and monitoring the total may be by any combination of methods however, the payment will only be by a lump sum under the item "Minor Changes".

(VI) PROJECT FILES

[1] CCIS INPUT "Minor Change" change orders must be entered into CCIS, however the required input is slightly abbreviated. Since a formal change order document as described in Chapter 1-2.4C(6) is not processed, the *Work Description* section in CCIS requiring a detailed upload of text is not required. However, the *Short Description* is required and should provide enough detail to identify the content of the "Minor Change" change order. All other information requested by CCIS, including changes to working days, is required.

[2] TRANSMITTAL Under the Minor Change process, the "Change Order - Minor Changes form # 421-005 EF" substitutes for the transmittal included in the more formal process described above. The information on the Minor Changes form should at a minimum briefly document three key items:

- A description of the change
- Reason for entitlement/why is this not paid by bid items.
- Any increase or decrease in cost and time and briefly how it was established.

[3] DISTRIBUTION When utilizing the "Minor Change" process, the minor change form is substituted for the change order document and the transmittal. The original, signed, "Minor Change" form shall be submitted to HQ. In the case of the "Minor Change" process, it is not necessary to route the backup documentation nor a CCIS print out, as part of the distribution. A copy of the form may be used to document the payment.

1-2.4D Force Account**1-2.4D(1) General**

When it is difficult to provide adequate measurement or to estimate the cost for certain items of work, force account may be used in order to pay the Contractor for performing the work. Some contract items may be set up to be paid by force account. Some change orders may require payment by force account. Section 1-09.6 of the *Standard Specifications* describes the boundaries for payment of work performed by the force account method. In any case, the purpose of force account is to fully reimburse the Contractor for costs incurred on the work. These costs may also include indirect segments, such as travel, per diem, safety training, industrial safety measures, overhead, profit and other hidden costs. The objective is to minimize the inclusion of any "contingencies" included in the contract bid in anticipation of costs that may be incurred during force account work and not reimbursed.

When work is added to the contract and is to be paid by force account, a change order will have been prepared describing the added work to be performed. The change order package will also contain an independent estimate of the cost to perform the added work. All non-standard force account items are assigned the Standard Item Number 7715.

Force account payments are typically not authorized for employees engaged in management or general supervisory work. The cost for this type of activity is presumed to be included in the Contractor's markups for overhead and profit. However a foreman or, in some cases, a dedicated superintendent devoting full time to the force account work is eligible for payment on the force account.

On projects that require the Contractor to employ trainees, these employees may be utilized in force account work.

The Project Engineer should consider a decision to direct force account work with the same degree of caution that would be applied to directing any other work on the contract. The Contractor should have the expertise to schedule the work and determine what equipment is required. In most cases, it is best that we allow the Contractor to propose the

method and approach to the work. Our most effective role would be to concur or approve of the Contractor's proposal or suggest modifications to it. Before any work is performed by the Contractor on a force account basis, the inspectors should review and agree with the Contractor upon:

1. **Labor.** The classification and approximate number of workers to be used, the wage rate to be paid those workers, whether or not travel allowance and subsistence is applicable to those workers, and what foreman, if any, will be paid for by force account. This agreement will be closely tied to the development of the Labor List.

2. **Materials.** The material to be used, including the cost and any freight charges whether the material is purchased specifically for the project or comes from the Contractor's own supply. For materials representing a significant cost, or where the industry experiences fluctuations in price, the contract allows for shopping and the Contractor may be directed to obtain quotations. If time permits and the situation seems appropriate, the Project Engineer may want to do this.

3. **Equipment.** The equipment to be used including the size, rating, capacity, or any other information to indicate the equipment is proper for the work to be performed whether the equipment to be used is owned by the Contractor or is to be rented. The cost per hour for the equipment to be used. In the case of rented equipment, the Engineer may ask for competitive quotations, provided the request is made in advance and there is time to obtain them.

Payment for force account work should be made on the same timely basis as any other item of work. When money is being withheld from a progress estimate, the criteria for withholding should apply equally to all items of work, not just to force account work, because of its method of payment.

The procedure for record keeping and payment of force account work on change orders shall be the same as for contract items to be paid by force account. Separate records are to be kept for each force account whether it is an item in the original contract or established as a result of a change order.

1-2.4D(2) Payment Procedures for Force Account Work

1. **Labor.** The specifications require the Contractor to prepare and submit a "Labor List" in advance of force account work. Once approved by the Project Engineer, this list provides the hourly rate for force account calculations until a new list is approved. New lists will not be approved retroactively and calculations previously made from an approved list will not be changed when a new list is approved. If the Contractor fails to submit a list before the first force account calculations are made, then the Project Engineer will determine the rates from the best data available (payrolls on this job, payrolls on other jobs, prevailing wage requirements, union information, etc). Labor list rates will include all the pieces of wage expense — base rates, benefits, assessments, travel, with allocations shown where necessary. Examples of Labor List entries might be:

Generic Laborer (Straight Time)		John Doe, Teamster (Overtime)	
Basic Wage/hr	\$21.36	Basic OT Wage/hr	\$32.81
FICA (7.65%)		FICA (7.65%)	
FUTA (0.80%)		FUTA (0.80%)	
SUTA (5.42%) Total =	2.96	SUTA (5.42%) Total =	4.55
Indust Ins \$1.01/hr	1.01	Indust Ins \$1.01/hr	1.01
Benefits/Hr \$30.78/hr	5.45	Benefits/Hr \$46.37/hr	8.00
Travel Expense		Travel Expense	
\$250/40 hrs	6.25/hr	\$250/40 hrs	\$52.62/hr
Total	\$37.03/hr	Total	\$52.62/hr
Use	\$37per hr	Use	\$53per hr

These examples show the rate rounded to the nearest dollar, which is permissible. If either party would prefer to use the unrounded amount, that is also acceptable. When deciding how many hours require compensation, the specification allows all hours that are a contractual obligation or are customary payments made to all employees. This means that, if a labor contract calls for 4 hours of pay for any call out, then that is a contractual obligation and the 4 hours would be eligible for reimbursement. (As always, the Contractor is expected to reassign the employees, if possible, to avoid the penalty.) In the same vein, a non-Union contractor, who has made call out payments to all employees for years, would be eligible for reimbursement for similar payments in a force account.

2. **Materials.** Materials also work from a list, but the list is generated in a different fashion. The Project Engineer provides the basic list of materials observed by the inspector. This is done in a timely manner (daily, unless the Contractor agrees otherwise). The Contractor adds prices to the list and attaches invoices or affidavits to support the prices. Once the list is returned and checked, payment can be made.

If a shipment of material is only partially consumed during the force account reporting period, the inspector may choose to include the entire amount in the first report or to estimate the amount consumed during each reporting period. The decision should be based upon the amount of the shipment, the nature and cost of the shipment and the security of the stockpile. A case of empty sandbags to be utilized throughout the winter for pollution control would adapt well to a single report, while a stockpile of galvanized conduit should probably be reported piecemeal as it is used in the work. The Contractor may use copies of the original invoice when the material is reported incrementally. If the Contractor has to restock unused material, restock charges can be reimbursed if the original order was reasonable for the work planned.

Along with supplying prices and invoices, the Contractor may suggest additions or corrections to the Materials List. These suggestions will be reviewed by the Project Engineer and, if appropriate, added before payment is made.

If the Contractor does not have an invoice, as in the case of stockpiles or some warehouse stock, then an affidavit will suffice. The Engineer may review the affidavit and, if it is an unreasonable price that cannot be supported, the Engineer may substitute another price, utilizing the best data available. The reasonableness of the price must consider the circumstances of the purchase and all costs associated with obtaining material from another source.

The specifications allow the Engineer to require competitive quotations, if this is done before the work is started and sufficient time is available. If the Contractor has to divert an employee to obtain the quotations, then that employee may be included in the labor reimbursement for the force account.

3. **Equipment.** The Project Engineer should review and comply with the rules governing payment for equipment as outlined in the most current AGC/WSDOT Equipment Rental Agreement. This agreement was developed as a supplement of the specifications and is relatively self explanatory.

There are three methods of acquiring equipment for use on a force account. "Owned" means that the Contractor controls and operates the equipment. A long term lease arrangement would be the same as ownership. Owned equipment is priced according to the Blue Book. "Rented to Operate" means that the Contractor has obtained a piece of equipment through a short term rental and will operate that equipment with its own employees. Rented to Operate equipment is priced according to the invoice from the rental agency. "Rented Operated" means that the Contractor has obtained a service from an individual or a company to provide a piece of equipment with an operator. An operated rental is not paid as equipment, but rather as a Service. In some cases, the Service will be reclassified as an entity performing in the manner of a subcontractor (see below).

Damage waivers are compensable. The Engineer has the discretion to reimburse for a damage waiver when it makes good business sense. Upon request, the Contractor should be able to demonstrate that the purchase of the damage waiver is consistent with their standard business practice. Consideration should be given to the potential risk of damage to the equipment versus the cost of paying for the damage waiver. In most cases, the cost of the waiver is minimal. The damage waiver does not cover damage caused by operator negligence, nor should the Department reimburse the Contractor for repair of any damage caused by operator negligence.

Normal wear and tear on equipment is included in the Blue Book rental rates. The ownership rates include major overhaul of the equipment. The Blue Book defines major overhaul as the periodic rebuilding of the engine, transmission, undercarriage, and other major equipment components. The operating rates include the cost of daily servicing of the equipment, including the replacement of small components such as pumps, carburetors, injectors, filters, belts, gaskets and worn lines. The operating rates also include the cost of expendables such as fuel, lubricants, filters, tires, and ground engaging components, such as pads, blades bucket teeth, etc.

The costs of extraordinary operating expendables are not covered in the operating rates due to their highly variable wear patterns. These extraordinary operating expendables may include certain ground engaging components, such as hammer and drill bits, drill steel, augers, saw blades, and tooth-bits. The cost for these items will normally be recovered separately, based upon invoices for their cost.

Repair of damage is considered a risk of providing equipment. The cost of this risk is assumed to be in the markup for overhead and profit. Neither costs for repair of damage nor insurance against such damage should be included in the force account direct charges. A common event is the offer of a Damage Claim Waiver by a renting agency. If such a charge appears on an invoice, it should be removed before payment is calculated.

As with Materials, the Engineer may require competitive bids for equipment rentals. Normally, this requirement must be made in advance, before the work is started. However, if the rental is not made in an "arm's length" transaction, for example when the contractor rents the equipment to himself through some sort of business structure, then after the fact quotations may be obtained from independent rental agencies and the lowest such quotation may be used in place of the rental invoice.

Finally, as a special insertion into this Manual, there is a separate method of paying for Pavement Routers for Crack Sealing. WSDOT has agreed to set aside the Blue Book rate for this equipment and to pay \$20 per hour for the operated router.

4. **Services.** Services billed by invoice will be compensated according to the invoice if that is the typical method in standard industry practice. Typical industry practice might include specialized technical services, such as Testing Labs and Environmental Cleanup firms. Also included might be unit price invoices, such as Sweeping per mile or Concrete Pumping per cubic yard, or lump sum quotation invoices, such as Remove Danger Tree or Pump Septic Tanks.

The markup for services depends on the nature of the firm's activities on the project. If the firm is clearly an uninvolved supplier, then the Service markup will apply. If the firm is acting as a subcontractor, then the markup will be made under the subcontractor provisions described below, with the underlying (subcontractor's) overhead and profit assumed to be embedded in the invoice.

It should be noted that payment of force account work through an invoice does not excuse the Contractor from other requirements of the contract. Wage rate rules, subcontractor approvals and other provisions are still contract requirements and must be enforced. Such enforcement, however, is independent of the administration of force accounts and force account payment will not ordinarily be withheld to aid in the enforcement. Note that the statutes associated with some provision requirements do involve the withholding of payment for associated work.

As with materials and equipment rentals, the Engineer may require competitive bids for invoiced services. Normally, this requirement must be made in advance, before the work is started. However, if the service is not obtained in an "arm's length" transaction, for example when the invoice comes from a subcontractor without sufficient effort to find competitive prices, then after the fact quotations may be obtained from independent service providers and the lowest such quotation may be used in place of the service invoice.

5. **Mobilization.** Mobilization and demobilization are reimbursable expenses for assembling equipment, materials, supplies and tools for any force account item and then returning those items to the previous location when the work is finished. Demobilization can include restocking costs for materials not utilized. Force account mobilization applies to original bid item force accounts as well as force accounts added through change orders. The standard bid item “Mobilization” is assumed to not include mobilization activities for force account work.

Mobilization may occur within the project limits if special efforts are required to assemble needed items to the force account location. For example, if a lowboy is required to move a bulldozer from one end of a project to the other, then that mobilization effort would be reimbursed.

If off site preparation work is needed, the Contractor must notify the Engineer in a timely enough manner that the work can be observed, if that is desired. Without such notice, that preparation work will not be reimbursed.

The AGC Agreement allows for pro-rating mobilization costs for equipment that will be used in both force account and bid item work. This will be done by negotiation and agreement. For example, if the Project Engineer and Superintendent agree that a mobilized backhoe will be used three hours on regular work for each hour on force account, then 25 percent of the mobilization costs would be paid on the force account.

All mobilization activities can be categorized as Labor, Equipment, Materials, or Services and will be listed under those categories for payment.

6. Other Payments

Permits or Fees

When a force account requires the Contractor to pay for permits or fees (hazardous waste dumping, etc.) that would fall outside the scope of overhead, these costs are reimbursable and may be included in the “Services” section of the force account payment.

Sales Tax

How retail sales tax is handled on the overall project depends on the ownership of the property upon which it rests. Keep in mind that a project may span more than one type of ownership.

STATE AND PRIVATELY OWNED LANDS

Work performed on state or privately owned land falls under Section 1-07.2(2) of the *Standard Specifications* and Department of Revenue Rule 170. Retail sales tax **is required** on the total contract amount. The Contracting Agency provides this payment to the Contractor to be passed through to the Department of Revenue. This is the tax noted in the summation of contract payments.

The Department of Revenue considers materials incorporated into the final work (such as concrete, signs, aggregates) to be an integral part of the completed improvement. These materials are purchased for “resale”. **No tax is required** when purchasing these materials, therefore, no tax is paid as part of force account payments or as part of pricing change

order work. The contractor purchases these materials as tax exempt and, in turn, sells them to the State as a part of the total project and the only tax collected is on the total contract as described previously.

There may be items that the contractor **is required** to pay sales tax on at the point of purchase. The Department of Revenue considers supplies consumed (such as concrete forms, fuel or tools, equipment purchased or rented) during the performance of the contract to be “consumables”, a part of the overall cost of doing business. The contractor is required to pay retail sales tax at the point of purchase/rental for these items. These costs are bid as a part of the associated bid items.

When calculating or estimating the cost of force account or change order work, sales tax should be included in the individual invoices for “consumable” items. It’s a fine line; for example, permanent striping is considered “resale” (tax exempt), temporary striping is a “consumable” (taxed). The fact that taxes are shown or not shown on invoices is not a reliable indication of what the contractor is obligated to pay. The contractor may receive reimbursement later or be required to pay additional taxes when the contract is complete. The contractor’s books are audited by the Department of Revenue upon completion of each project to ensure compliance. The Project Engineer must apply these guidelines as closely as possible. Note that, in some cases, it is possible and necessary to pay a tax on a tax.

CITY, COUNTY, AND FEDERALLY OWNED LAND

Work performed on city, county or federally owned lands falls under Section 1-7.2(1) of the *Standard Specifications* and Department of Revenue rule 171. Retail sales tax **is not required** on the total contract amount.

The Contractor **is required** to pay retail sales tax on all purchases regardless of use (“consumable” or not). For contract work, this expense is incidental and therefore included in the individual contract items as a part of the bid amount.

When calculating or estimating the cost of force account or change order work, sales tax should be included on all invoices. As stated previously, the fact that taxes are shown or not shown on invoices is not a reliable indication of what the contractor is obligated to pay. The contractor may receive reimbursement later or be required to pay additional taxes when the contract is complete. The contractor’s books are audited by the Department of Revenue upon completion of each project to ensure compliance.

Exceptions

Construction of the following facilities has been specifically exempted from Department of Revenue rule 171. Work on these facilities falls under Department of Revenue rule 170 even if they are on non state owned land:

- Water mains
- Sanitary sewers, if they are not a part of the road drainage system
- Telephone and telegraph lines

- Electrical power, if such power does not become a part of a street or road lighting system
- Other conduits or lines

Conclusion

Most of the time, retail sales tax on invoices is required. In turn, we need to reimburse the contractor for the tax (paid or deferred) on force account invoices and include the costs when estimating the value of change order work.

The one exception is “resale” items if the contract falls under Department of Revenue rule 170. “Resale” items under this rule do not require that retail sales tax be paid at the point of purchase.

These rules should be adhered to regardless of whether retail sales tax is shown on the invoice.

Subcontractor Markup

If work is being performed by a subcontractor (or by a service supplier acting in the manner of a subcontractor), then a supplemental markup will be added. This supplement will be added one time for each payment, even if a lower-tier subcontractor is doing the work. The markup is a graduated step down rate, which gets smaller for each force account item as the amount of work increases.

The amounts on which the rate is determined will be tracked separately for each subcontractor on each force account item included in the original contract or added by change order. If two subcontractors work on the same force account, then the accumulated total will be tracked for each, and markup for work done by each will be according to the respective total. If a single subcontractor works on two force accounts, then there will be a running total of work done by that subcontractor on each account and the markup rate for the same sub on different force accounts could be different.

1-2.4D(3) Records and Source Documents

Accurate daily time records should always be kept when performing force account work. Form 422-008, “Daily Report of Force Account Worked”, is provided for the Project Engineer’s use to help facilitate timely, accurate, and complete records of the daily force account activities. Whatever method of record keeping is used, it is recommended that the document be signed by both the Inspector and a representative of the Contractor agreeing on the materials used and the hours noted for labor and equipment. A copy of the daily report must be provided to the Contractor. When the work is performed by a subcontractor, a copy should also be provided to the subcontractor.

The costs for force account work should be determined and entered into the CAPS system in as timely a manner as possible.

All calculations for determining force account costs should be checked, initialed, and dated. After the cost of the work has been computed in the office, a copy of calculations shall be furnished to the Contractor.

1-2.4D(4) Summary

To summarize, the purpose of force account is to fully reimburse the Contractor for costs incurred on the work. The objective of force account administration is to minimize the inclusion of any “contingencies” included in the contract bid in anticipation of costs that may be incurred during force account work and not reimbursed.

Items which are bid or negotiated with a unit price or a lump sum agreement will not be converted to force account unless a change (as defined in Section 1-04.4 of the *Standard Specifications*) has occurred. On the other hand, any work to be done or the remaining portion of work underway on a force account basis may be converted to unit prices or a lump sum at any time the parties can reach an agreement. Such a conversion is highly desirable and should always be a goal of the Project Engineer.

1-2.4E Differing Site Conditions (Changed Conditions)

There are two types of changed conditions. The first (Type I) is a hidden condition that is different from that indicated by the contract (the borings do not show this rock). The second (Type II) is a hidden condition that is not shown differently in the contract, but is unusual and different from what a reasonably prudent contractor would expect (I’ve never seen this before and nobody else has ever seen it, either). In either case, to qualify for renegotiation, the condition must have a “material” affect on the cost of doing work. In other words, there must be a definable difference in the way the work will now be done and that difference must be significant.

The contractual rules included in Section 1-04.7 are related to fair notice and to giving the State an opportunity to examine the condition and, perhaps, order a different approach to the work. If the contractor takes away this opportunity, then there may be grounds for denying compensation for the different approach to the work. In some cases, the changed situation is not recognized until much or all of the work has been done. In that case, the determining factor for notice is the time when the Contractor knew or should have known of the condition. Whenever notice is served, it must be written.

In a perfect world, a changed condition will be recognized, notice will be given and work will be stopped until all the interested parties can reach agreement on how to proceed. In the real world, we are often faced with traffic closures and safety issues. Contractors work on tight schedules with one activity interdependent on others and it is not in the public interest to stop work while a changed condition discussion takes place. As soon as possible, to the extent possible, and in any manner which accomplishes the intent, the Project Engineer is expected to consult with the Region Construction Manager and the State Construction Office to obtain the approval before agreeing that a changed condition exists or before entering negotiations for price adjustments.

The Department response to a contractor’s assertion of changed conditions, whether agreement or denial, must be written. The Project Engineer must keep accurate time and material records whether the response was negative or positive.

1-2.4F Termination of Contract

Contract termination is divided into two major categories, termination for default and termination for public convenience. Section 1-08.10(1) of the *Standard Specifications* defines the situations when a contract may be terminated for default (doesn't happen very often.) Section 1-08.10(2) of the *Standard Specifications* defines the situations when a contract may be terminated for public convenience.

Keep in mind that the conditions of the termination may be negotiated in the event that the termination is in the best interest of both parties. An example would be if a major change is beyond the abilities of the contractor. Negotiations with regard to conditions of the termination may include pricing partially completed items, mobilization payment, or the State taking possession of fabricated/purchased materials.

In both categories, if federal funds are involved, FHWA needs to be notified and informed of the situation early in the process. Specifically, Federal participation eligibility should be discussed prior to making a decision on termination. Formal notification and discussion should use normal channels through the Region to the State Construction Office. Authority to terminate a contract rests with the same position that had authority to execute the contract.

1-2.4G Subletting Portions of the Contract

Requests by the Contractor for subletting are submitted on Form 421-012 (Request to Sublet) and are to be approved by the Regional construction manager or designee. The request must be approved prior to the performance of any work on the project by either the subcontractor or a lower-tier sub. A copy of the Statement of Intent to Pay Prevailing Wages, executed by the subcontractor or lower-tier sub and approved by Washington State L&I, must be provided to the Project Engineer by the Contractor prior to payment for any work performed by that subcontractor or lower-tier sub. In addition, for Federal-aid projects, Form 420-004 (Contractor and Subcontractor or Lower-Tier Subcontractor Certification for Federal-aid Projects), must be submitted with the Request to Sublet.

Section 1-08.1 of the *Standard Specifications* defines what is not considered to be subcontracting. By default, any entity performing bid item work on the project is a subcontractor, unless: (1) they are the Prime Contractor, (2) an Owner furnished resource (such as WSP, utility owner or its contractor or consultant), or (3) they are specifically excluded from consideration as a subcontractor in Section 1-08.1. Do not be confused by the distinction between Professional Services and Subcontractors in the markups for force account work described in Section 1-09.6. Those provisions apply only to how the markup for overhead and profit is applied to force account work, and they have no relationship to the requirement for a Request to Sublet.

If a subcontractor wishes to further sublet a portion of its work to a lower-tier firm, the Contractor must submit the name of the lower-tier firm along with the request to sublet the work to the subcontractor. If more than one subcontractor on a project wants to utilize the same firm as a lower-tier subcontractor, separate requests are required. Section 1-08.1 of the *Standard Specifications* sets limitations on the amount of work a lower-tier sub may perform for each subcontractor. Section 1-08.1 of the *Standard Specifications* also sets forth the procedure for subletting portions of the project, and the percentage of the contract which may be sublet. The dollar value to be used for determining the amount of work that must be performed by the Prime Contractor is the total original contract amount less the amount of any specialty items which have been subcontracted. In order to ensure proper tracking and reporting of sublet information, the Project Office shall enter data from each request to sublet into the CCIS database. When the Project Office is in a situation where the CCIS database is not utilized during the administration of a project (i.e. Emergency Contracts, State Aid Contracts, etc.), and requires the "hand calculation" of the percentage of amount sublet, the percentage will be calculated for all items except specialty items, using the amount shown on the Request to Sublet or the bid amount whichever is smaller.

When Condition of Award items are sublet, ensure that the total amount is equal to or greater than the amount in the Condition of Award letter and that the Condition of Award items will be sublet to the proper Condition of Award subcontractor. If a bid item shown on the Condition of Award letter is not sublet to the proper D/M/WBE, then the request cannot be approved until the contract is changed.

1-2.4H Contractors' Shop Plans and Working Drawings

In general, all shop drawings and supplemental details submitted by the Contractor should be checked, in detail, for conformance to all contract requirements before forwarding on for approval or further actions by others. A Change Order is required for any deviation from the contract plans. Any conflicts with the contract plans that have been detected or revisions that may be desired by the Project Engineer should be noted on one copy of the drawings being forwarded to Headquarters for approval. If Change Orders to cover any deviations from the contract plans have been issued, or are being processed, those changes should also be noted.

Figure 1-6 is a list of many of the most common shop plans and drawings, and includes references to the specifications that require them and the section of this manual that covers the procedures for processing them. Use Form 410-025 to transmit all listed bridge and structure plans to the Bridge and Structures Engineer.

The Project Engineer should maintain a log of all shop plans or other drawings received for each contract.

Shop plans for items that conform to the contract plans or a standard plan, except those listed in Figure 1-6, should be checked and approved by the Project Engineer.

1-2.4I Relief of Responsibility for Completed Work and Relief of Responsibility for Damage by Public Traffic

Section 1-07.13(1) specifically designates the Contractor as being solely responsible for the completed work or material until the entire improvement has been completed. All work and material, including change order work, is at the sole risk of the contractor and when damaged must be rebuilt, repaired, or restored. When these damages occur to either the permanent or temporary work, and have occurred prior to the contract Completion Date, the costs for these repairs shall be entirely at the Contractor's expense. However, the specification does provide the contractor exceptions for causes that are generally beyond the contractor's control.

While the Contractor is fully responsible for the work and materials, the section does provide the contractor some options for relief. Relief is broken into 2 categories. The first category being relief of maintenance and protection for portions of works that have been completed. The second category is for relief of damage caused by the public when it is necessary that the public use the facility during construction. Both options for relief have specific criteria in order to exercise them. While a brief explanation of each option is provided, the Project Engineer should review the entire Section 1-07.13 of the *Standard Specifications* to ensure that the extent of responsibilities are understood and that any relief from responsibility is granted in accordance with those provisions.

Section 1-07.13(2) provides relief to the Contractor from maintaining and protecting specific portions of contract work as they are completed. The Contractor must submit a written request for relief to the Project Engineer. Before granting any relief, the Project Engineer will review the request to ensure that the items of work noted conform to the requirements and limitations outlined in Section 1-07.13(2) of the *Standard Specifications* and have been fully completed in all respects of the contract. The Regional Construction Manager or designee may approve these requests for relief. Relief may be granted for several specific items, for example: "Item 17, Beam Guardrail, Type I; Item 18, Beam Guardrail Anchor Type I; etc." Relief may also be granted for all work except certain items, for example: "All work except Item 38, Electrical." the approval of the Contractor's request must be in writing.

When it is necessary for public traffic to utilize a highway facility during construction, Section 1-07.13(3) of the *Standard Specifications* provides relief of responsibility to the Contractor for damage caused to the permanent work by the public traffic. When the conditions specified in this section are met, the Contractor is automatically relieved of this responsibility. However, this section does not provide relief for damage caused by vandalism or other causes. The Contractor will resume full responsibility for both temporary and permanent work if traffic is relocated to another section of roadway. This responsibility will again continue until contract completion unless the section is reopened to public traffic or the Contractor is granted relief under 1-07.13(2).

The first paragraph of Section 1-07.13(3) refers to damage to "permanent work". This refers to work included in the contract that is being constructed in accordance with the requirements noted in the plans and specifications and is damaged. The intent is to exclude equipment, temporary facilities and temporary materials such as formwork and falsework. Contract features such as "Temporary Traffic Barrier," are included if they have been constructed according to plan and are damaged by public traffic using an approved traffic plan.

1-2.4J Protested Work

Occasions may arise where the contract may not have fully or clearly defined a work activity or financial responsibility. In these cases, the Project Engineer may determine that, in order to avoid delay of other critical work, protect the traveling public, or other critical circumstances, it may be necessary to direct the Contractor to proceed immediately to complete the work. In some instances, this order may be against the Contractor's wishes. While acknowledging the Contractor's verbal protest, the Project Engineer should again direct the contractor to proceed with the work in accordance with Section 1-04.5 of the *Standard Specifications*. The Contractor should also be advised that, as a separate action, they should follow the guidance in this same section for protest and protest resolution. While these provisions require the Contractor to keep accurate records for completing the protested work, it is not advisable for the Project Engineer to rely on these records to determine what may have taken place when trying to verify costs for protested work many months later. In order to help document the Contractor's work, the form "Report of Protested Work" (DOT Form 422-007) was developed as a tool for the Project Engineer's use.

1-2.4K Metric Designed Projects Administered with English Standard Specifications

Some recent projects, whose plans were developed using Metric dimensions, are being administered utilizing the English version of the *Standard Specifications*. Any dimensions in the *Standard Specifications*, Amendments, or Special Provisions that are expressed in English terms are to be converted, utilizing a precise arithmetical "hard" conversion method, to equivalent Metric units, when necessary, to be compared to the contract documents, field conditions or Contractor's equipment or operations.

The Department still has some Metric projects "on the shelf". There are also Metric jobs being developed for other agencies, such as Sound Transit. Since there is no current Metric Standard Specification Book, those jobs will be administered using the English book. Several General Special Provisions will be included to accomplish this. These provisions require that, whenever an English dimension or value in the specifications needs to be compared with a contract plan or provision, a field condition or measurement or with the Contractor's equipment or operation, the necessary conversion will be made utilizing a precise arithmetical "hard" conversion method.

To accomplish the conversion to English specifications, a series of General Special Provisions have been developed to replace those Metric specifications that contain soft conversions. In all cases, the English specifications have been left intact so that, if items must be added through change order, English units may be utilized with the reference to the *Standard Specifications* without including all the Metric specs in the change order.

The old Metric books contained provisions for “soft” or approximate conversions for a number of elements (bolts, re-steel, etc.). These have been converted to General Special Provisions which will be included with all Metric plan sets. This will allow these exceptions to the “hard” conversion rule noted above. Metric plan sets will have Metric pay units. Change orders on Metric plan set jobs will automatically reference the English specifications and will require English units.

When making payment to the contractor, the project office should measure and pay for the bid item, either Metric or English, indicated as the unit of measure in the contract plan or change order. For example, if the contract calls for “Clearing and Grubbing” to be paid for by the hectare, then the engineer should instruct his crew to measure and pay for the work performed in metric units. The opposite would apply if a change order was written for the project utilizing the English specifications for clearing and grubbing. In that case, the bid item would be measured and paid for in English units (by the acre).

If a situation arises when a conversion is required from English to Metric for an interpretation, a measurement or a payment, the conversion should be made utilizing a “hard” conversion factor. In the case of a payment, the level of precision of the factor will be such that the resulting payment will not vary from the true calculated value by more than one dollar.

1-2.5 Contract Time

1-2.5A General

The contract duration specified for physically completing the contract is stated in the contract provisions normally under the general special provision “Time For Completion.” Although there are exceptions, the guidance in this chapter pertains to contracts in which time is accounted for in terms of working days.

The Contractor may begin work as soon as the contract is executed and shall prosecute the work diligently until physical completion has been reached.

The Region will be notified by telephone on the day the contract is executed by WSDOT. Because it can take several days for the executed contract to reach the Contractor, the Region should immediately provide the Contractor with verbal notification of the date of execution so that the Contractor may order materials and prepare to mobilize onto the project and begin work. The date the contractor actually begins work on the project is to be noted and entered into CCIS.

Between the execution of the contract and the acceptance by the State Construction Engineer, the Project Engineer will likely encounter time-related issues. These will be documented through Weekly Statements of Working Days (Section 1-08.5), Suspensions of Work (1-08.6), Protested Work (Section 1-04.5), and Time Extensions (Section 1-08.8).

Contract Completion Milestones

There are two milestones that establish the end of contract time. They are defined in Section 1-01.3 of the *Standard Specifications* as Substantial Completion and Physical Completion. These two milestones are discussed in greater detail later in this chapter.

1-2.5A(1) Progress Schedules

The requirements for progress schedules are specified in Section 1-08.3 of the *Standard Specifications*. A copy of the specified reference, *Construction Planning and Scheduling, Second Edition*, published by the Associated General Contractors of America, has been sent to each Project Office and each Region Construction Office. One of three progress schedules will be specified in the contract. Two types of progress schedules are identified in the *Standard Specifications*, Type A and Type B. A third type may be inserted in the contract as a General Special Provision specifying a Type C Progress Schedule. The three types of progress schedules represent levels of job complexity. Type A being the simplest and easiest to produce and Type C being the most complex. Application is such that the complexity of the project (whether it be timing, coordination or the work itself) will be reflected in the complexity of the schedule.

In addition, a preliminary schedule is required on contracts requiring Type B or C Progress Schedules. Preliminary progress schedules show the work to be accomplished within the first 60 working days. As always the contract provisions may contain requirements that add to, or supersede, all or parts of Section 1-08.3 to allow for special circumstances.

There are four basic reasons that we ask for a schedule:

- To better understand the contractor’s plan to deliver the project within the time allowed
- To plan our work force and other resource requirements
- To advise the public and executive staff of major milestones
- And to enable us to actively manage impacts to the contract

Progress schedules should have sufficient detail such that the progress of the work can be evaluated accurately at any time during the performance of the contract. The owner is obligated by contract to return the schedule for correction or approve it within 15 calendar days of receipt. Approval requires that the schedule complies not only with Section 1-08.3 but it demonstrates compliance with other contract requirements such as interim completions, staged work, order of work, etc. Periodically as warranted by progress, delays or changes, the Project Engineer should review the schedule for accuracy and progress of work. If it is determined that the current schedule does not provide the required information or

is no longer accurate, a Type B supplemental schedule update may be requested from the Contractor. Monthly updates are required when Type C progress schedules are specified, and the cost of the updates is included in the Lump Sum price of the bid item.

The cost of Type B schedule updates is not included in the Lump Sum price of the bid item. When work is added to the project or the work method is changed at the request of the contracting agency, the respective cost to update the Type B progress schedule should be included in the change order. Type B schedule updates driven by the contractor's actions shall be provided to the contracting agency and are considered incidental to other work. No payment is made for Type A Progress Schedules or Type A schedule updates. Type B and C Progress Schedules are paid as a lump sum. Eighty percent of the lump sum payment is paid upon approval of the initial schedule. The remaining portion is paid when eighty percent of the original work is completed, provided updates have been provided as requested. Weekly look-ahead schedules are considered incidental to other items of work in the contract and therefore are not paid for separately.

When the Contractor has failed to provide a required schedule, the Engineer may:

- Withhold payment for the Type B or Type C schedule if it is not received (but not for other conforming work).
- Withhold all progress payments for failure to comply with the terms of the contract as specified in Section 1-09.9 (this should be a rare event).
- Suspend work and continue to charge each day as workable (this should only be implemented when the Agency is harmed by lack of knowledge of the contractor's intended approach to the work).

In extreme cases, the Agency may determine that the Contractor is in breach of contract according to Section 1-08.10 (usually accompanied by other serious breaches).

When lacking a progress schedule, the Engineer must base progress on the information available and their best judgment. According to Section 1-08.5, the Contractor may protest working day charges, but must support the protest in sufficient detail to enable the Engineer to ascertain the basis and amount of time disputed. This provides another opportunity for the PE to communicate our need for a progress schedule.

1-2.5A(1) Review and Approval of Progress Schedules

It is the responsibility of the Project Engineer to insure that the Contractor submits a correct and complete progress schedule in the time specified. Progress schedules must meet the general as well as type specific criteria. Once it is determined that the progress schedule submitted is of the type specified by the contract, the Project Engineer should evaluate the schedule to determine if it meets the requirements of Section 1-08.3 of the *Standard Specifications*, the Special Provisions and the Contract.

(I) General Requirements

- The progress schedule must include all activities necessary to physically complete the project. By definition, activities consume time and usually consume resources. Activities like concrete curing time and slope staking earthwork may be rolled-up into the overall duration of the activity.
- The progress schedule must show the planned order of work in logical sequence, and in compliance with any requirements of the contract. The reviewer should remember that some work is sequenced by factors inherent in the work, but the Contractor may sequence the work by their preference as long as the project is completed within the authorized time and in conformance to the contract.
- The progress schedule must show durations of work activities in working days. Except for defining nonworking days, the calendar has no relationship to administering contract time. An activity may be stalled by unsuitable weather for days or weeks and remain "on schedule".
- The progress schedule must show activities in durations that are reasonable for the intended work. Since durations of work are a function of resource allocation, the Project Engineer may be required to estimate production rates using estimating manuals, experience or other resources, or to ask the Contractor to explain their planned resource allocation to support the duration.
- The progress schedule must define activities in sufficient detail that progress of individual activities may be evaluated on a daily basis. The reviewer should keep in mind that the level of detail required in a progress schedule is driven by the amount of precision required to perform and monitor the work. For example a single activity that represents several miles of grading may not provide adequate detail, and may need to be subdivided into smaller activities described by station limits.
- The progress schedule must show the physical completion of all contract work within the authorized contract time.

WSDOT may accept a Progress Schedule indicating and early physical completion date but cannot guarantee that WSDOT's resources will be available to meet an accelerated schedule.

If the progress schedule does not provide the required information, it should be returned to the Contractor for correction and resubmittal. Because the *Standard Specifications* do not specify timelines for resubmittal, the Engineer should provide a reasonable amount of time for the Contractor to revise and resubmit the schedule, and advise the Contractor of the expected date of resubmittal.

(II) Type A Progress Schedule

Type A Progress Schedules are required for any projects that do not include the bid item for Type B Progress Schedule or Type C Progress Schedule. The Contractor is required to submit five copies of Type A Progress Schedules to the Engineer within ten calendar days after the date the contract is executed. This may be a critical path method (CPM) schedule, a bar chart, or other standard schedule format, such as fenced bar charts, linear schedules, PERT networks and others. These scheduling methods are described in detail in the benchmark document "Construction Planning and Scheduling, Second Edition", a copy of which has been provided to each Project Office and each Region Construction Office. The Contractor is required to identify the critical path of the project, because a bar chart schedule does not rely on network calculations to determine the critical path.

The Engineer will evaluate this schedule and approve or return it for correction within 15 calendar days of receiving the submittal.

(III) Type B Progress Schedule

Type B Progress Schedules are required for all projects containing the bid item for Type B Progress Schedule.

The Contractor is required to submit a preliminary schedule to the Engineer no later than five calendar days after the date the contract is executed. Preliminary schedules must meet all requirements of a Type B Progress Schedule except that they may be limited to activities occurring in the first 60 days of the project.

The Contractor is required to submit five copies of the Type B Progress Schedule to the Engineer no later than 30 calendar days from the date that the contract is executed. This schedule must be a critical path method (CPM) schedule developed by the Precedence Diagramming Method and may employ restraints provided the restraints do not alter the network logic or critical path. As a minimum the Type B Progress Schedule must show:

- The Contract Number and Title
- Construction Start Date
- Critical Path
- Activity Description
- Milestone Description
- Activity Duration
- Predecessor Activities
- Successors Activities
- Early Start and Early Finish for each activity
- Late Start and Late Finish for each activity
- Total Float and Free Float for each activity
- Physical Completion Date
- Data Date

(Many of these terms are defined in "Construction Planning and Scheduling.")

The reviewer should watch for fixed date constraints that override network logic and force activities to become critical. Specific work windows or "open to traffic" milestones may legitimately influence sequence and duration of related activities. Resource constraints (such as availability of a large crane) may be preferential and may be explained by the Contractor if necessary. Fixed completion milestones for work that is susceptible to unsuitable weather are inappropriate because completion may be extended by the determination of unworkable days.

It is not unusual to see dual critical paths on a CPM schedule, nor is it prohibited. Multiple critical paths are generally very short in duration. Lengthy occurrences of parallel critical activities should be cause for careful scrutiny of activity durations and sequencing.

The Engineer will evaluate this schedule to insure that all required information is included in the schedule, check the network calculations, and approve or return it for correction within 15 calendar days of receiving the submittal.

(IV) Type C Progress Schedule

Type C Progress Schedules are required for all projects that include the bid item for Type C Progress Schedule. The Contractor is required five copies of a preliminary Type C Progress Schedule to the Engineer no later than the first working day (as defined in Section 1-08.5 of the Standard Specification). The preliminary schedule must meet all requirements of a Type C Progress Schedule and of Section 1-08.3(1) except that it may be limited to activities occurring within the first 60 working days.

The Contractor is required to submit five printed copies of a Type C Progress Schedule no later than 60 calendar days after the contract is executed. If the Contractor can demonstrate that they are unable to determine resource availability, and that this lack of information prevents them from preparing a reasonable schedule, the Engineer may allow an additional 30 calendar day for schedule submittal.

Each time that a preliminary schedule, Progress Schedule, or Schedule Update is submitted, the Contractor is required to provide the Engineer with an electronic copy of that schedule, on CD-ROM in Primavera Project Planer Enterprise Version, P3e/c or P3 format.

Type C Progress Schedules must contain all of the information required of a Type B schedule, and the following additional information:

- A timed scale logic diagram.
- Activities for traffic detours and closures.
- Milestones for required delivery of State furnished materials (if any)
- Activities for State furnished traffic controller resources (if any).
- Activities for fabrication of materials with longer than 120 calendar days lead time.

- Fixed constraints shall be identified on the activity listing and be supplemented with a written narrative describing why the constraint exists.
- Monthly schedule updates.

If requested by the Engineer, the Contractor shall provide a written narrative describing assumed production rates and planned resource allocation to support activity durations.

(V) Weekly Look-Ahead Schedule

Weekly Look-Ahead Schedules are required for all projects. The Contractor is required to submit a Weekly Look-Ahead Schedule, for each week that work is to be performed on the project, showing Contractor and all subcontractor activities for the next two weeks. The Weekly Look-Ahead Schedule must show:

- Description of the work
- Duration of the work.
- Sequence of the work.
- Planned hours of work.

The specification requires that Look-Ahead Schedules show the contractor's planned hours of work. This information is necessary to evaluate the results of unsuitable weather on the critical path and to assess working days charges correctly.

This schedule is to be submitted by mid-week of the week preceding the scheduled work, or other mutually agreed upon submittal time.

(VI) Schedule Update

Schedule Updates are required for all projects. The Engineer may request schedule updates when any of the following events occur:

- A change that affects the critical path.
- The sequence of work is changed from that in the approved schedule.
- The project is significantly delayed (10 days or 10 percent of the original contract time, whichever is greater).
- An extension of contract time is requested.

It is important to note that schedule updates are only required when they are requested by the Project Engineer, when a contractor submits a request for a time extension, or monthly in the case of a Type C Progress Schedule. The Project Engineer may request an update when any of the triggers occurs, but may choose to forego the update if the impacts to the schedule are readily evident.

The Contractor is required to submit five copies of the Schedule Update for approval within 15 calendar days of a written request, or when an update is required by contract provisions.

In addition to all other requirements, a Schedule Update must show:

- Actual duration and sequence of as-constructed work activities, including changed work.
- Approved time extensions.
- Construction delays or other conditions that affect the progress of work.
- Modifications to sequence or duration of remaining work.
- Physical completion of all remaining work within the remaining time authorized.

It is important to know the difference between an as-planned schedule and an as-constructed schedule. All updates must show the as-constructed sequence and actual durations of all activities prior to the status date.

When the need for a schedule update is triggered by an event that is the contractor's doing, they are responsible for the cost. When WSDOT causes an event or requests an update for their need, payment will be made as part of an equitable adjustment. When WSDOT is adding work or time by means of a change order, the price of the schedule update can be included as part of the work.

Any unresolved request for time extension must be shown by assuming that no time extension will be granted, and by showing the effects to follow-on activities necessary to physically complete the project within the currently authorized time for completion.

Working Drawing Type	Const Manual References	Standard Spec References	Number of Copies	Reviewer Prior to Approval	Approving Authority	Distributor of the Approved Drawings	Distribution (surplus copies stay @ PE)	Notes
Cofferdams and Cribbs	6-1.5	2-09.3(3)D which refers to Sections 6-01.9 and 6-02.3(16)	6 sets to Bridge 2 sets to PE 4 additional sets to Bridge if RR is involved	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	2 sets to Contractor 1 set to Region Const	PE Stamp is Req'd
Precast Concrete Panels	None	6-02.3(28)A	7 sets to Bridge 2 sets to PE 4 additional sets to Bridge if RR is involved	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	1 set to State Const. 2 sets to Contractor 1 set to Fabrication Inspector	
Bridge Demolition Plans	None	None. See Special Provisions	4 sets	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	2 sets to Contractor 1 set to Region Const	PE Stamp is Req'd.
Falsework Plans	6-1.5	6-02.3(16)	6 sets to Bridge 2 sets to PE 4 additional sets to Bridge if RR is involved	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	2 sets to Contractor 1 set to Region Const	PE Stamp is Req'd
Forming Plans	6-1.5	6-02.3(16)	6 sets to Bridge 2 sets to PE 4 additional sets to Bridge if RR is involved	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	2 sets to Contractor 1 set to Region Const	PE Stamp is Req'd
Plans for Hydraulic Items	7-2	None	7 sets	Project Engineer & Hydraulic Engineer	Hydraulic Engineer	Project Engineer	2 sets to State Hydraulic Section 2 sets to Contractor	
Roadside Plant/Weed Control Plan	None	8-02.3(2)	4 sets	Project Engineer	Project Engineer	Project Engineer	2 sets to Contractor 1 set to Region Const.	
Shop Plans for Luminaire and Traffic Signal Poles & Metal Bridge Rail	8-20.2B	8-20.2(1)	6 sets	Project Engineer & Bridge & Structures Engineer	Bridge & Structures for light standards and Types II, III, IV, V and SD signal standards. Project Engineer for Types PPB, PS, and I signal standards shown on Standard Plan J-7a.	Project Engineer	2 sets to Contractor 2 sets to Fabrication Inspector	Shop drawings are only required for signal and light standards without pre-approved plans.
Post-Tension Shop Drawings	6-2.8	6.02.3(26)D	7 sets to Bridge 2sets to PE	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	1 set to State Const. 2 sets to Contractor 1 set to Region Const.	
Shaft Installation Plan	6-2.3E	None. See Special Provisions	3 sets to Bridge 1 set to PE	Bridge & Structures Engineer, & Geotech. Engr. & State Bridge Const. Engr.	Bridge & Structures Engineer	Project Engineer		

Shop Plans & Working Drawings
Figure 1-6
(page 1 of 2)

Working Drawing Type	Const Manual References	Standard Spec References	Number of Copies	Reviewer Prior to Approval	Approving Authority	Distributor of the Approved Drawings	Distribution (surplus copies stay @ PE)	Notes
Shop Detail Plans of Prestressed Concrete Girders, Prestressed & Precast Conc Piles,	6-2.7A	6-02.3(16)B and 6-02.3(25)A None for Piliings	5 sets	Project Engineer & Bridge & Structures Engineer	PE can approve standard series I girders and concrete piling on standard plans E-4 & E-4a - all other prestressed concrete products and precast piles to Bridge & Structures for approval	Project Engineer	1 set to Contractor 2 sets to Fabrication Inspector	
Girder Erection Plans	None	6-02.3(16) and 6-02.3(25)N 6-03.3(7)A	6 sets to Bridge 2 sets to PE 4 additional sets to Bridge if RR is involved.	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	2 sets to Contractor 1 set to Region Const	PE Stamp is Req'd
Shop Plans for Sign Structures	8-21.3	8-21.3(9)A which refers to Section 6-03.	6 sets	Project Engineer & Bridge & Structures Engineer	Project Engineer for Standard Plans G2 through G9a Bridge & Structures for special design sign structures or sign fittings	Project Engineer	2 sets to Contractor 2 sets to Fabrication Inspector	
Shop Plans for Standard Plan Items	1-2.4I	None	6 sets	Project Engineer	Project Engineer	Project Engineer	2 sets to Contractor 1 set to Fabrication Inspector	
Shop Plans for Structural Steel for Bridges	6-3.1	6-03.3(7)	8 sets to Bridge 2 sets to PE 4 additional sets to Bridge if RR is involved.	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	1 set to Region Const. 2 sets to State Mat'l's Lab 2 sets to Contractor	
Treated Timber Structures	6-4.1	6-04.3(3)	6 sets	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	2 sets to Contractor 1 set to Fabrication Inspector	
Water Distr Conc Cyl Pipe	9-4.67	None	7 sets	Project Engineer & Hydraulic Engineer	Hydraulic Engineer	Project Engineer	2 sets to State Hydraulic Section 2 sets to Contractor	
Welding Reinforcing Steel	6-2.6D	6-02.3(24)E	7 welding procedure	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	2 sets to Contractor 2 sets to Fabrication Inspector	
Welding Steel Piling	6-5.6	6-05.3(6) 6-03.3(25)	7 welding procedures	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	2 sets to Contractor 2 sets to Fabrication Inspector	
Welding Structural Steel	6-3.6C	6-03.3(25)	8 sets to Bridge 2 sets to PE 4 additional sets to Bridge if RR is involved.	Project Engineer & Bridge & Structures Engineer	Bridge & Structures Engineer	Project Engineer	1 Set to Region Const. 2 sets to State Mat'l's Lab 2 sets to Contractor	Welding procedures must be submitted with shop drawings. (Section 6-03.3(25))

Figure 1-6
(page 2 of 2)

1-2.5B Working Day Charges

The first working day will be established in accordance with Section 1-08.4 of the *Standard Specifications* or such other date as prescribed by the contract provisions. Section 1-08.4 indicates that time may start at a time different from that specified if “otherwise approved in writing”. Such other approval is intended only for very unusual circumstances, usually associated with mis-handling of contract documents. It will only be granted in consultation with Headquarters Construction. Time associated with each phase of work established in the contract is to be shown on the Weekly Statement of Working Days. The Project Engineer is to furnish a weekly statement advising the Contractor of the current status of working day charges against the contract. Weekly Statements are generated by the CCIS computer system. This statement is to be issued in accordance with Section 1-08.5 of the *Standard Specifications*. The purpose of this statement is to advise the Contractor about the Project Engineer’s decision for each passing day. The questions to be answered when determining if a day is chargeable are; is it a nonworking day (holiday or a day the contract does not allow critical work to advance)? was it a chargeable working day (critical work progressed uninhibited)? or was it an unworkable day (critical work delayed by weather or conditions caused by the weather)? in evaluating each day, the Project Engineer should take into consideration the following conditions:

1. The effect of inclement weather on critical activities.
2. The effect of conditions caused by inclement weather on critical activities.
3. Critical work restrictions imposed by the contract or the Project Engineer.

If any of the above conditions prevent work or reduce the Contractor’s efficiency on critical activities on the project, working day charges shall be adjusted accordingly. If the Contractor is able to continue work on critical activities but the efficiency is significantly reduced, a half day may be charged. When determining unworkable days the Project Engineer shall take into consideration the prolonged effects of weather events. If the contractor is required to divert resources from working on critical path activities due to the lasting effects of a weather event the Project Engineer may determine a half day, the whole day or several days as unworkable.

If the contract does not specifically define a working day, a working day will be considered a 24 hour period. The contractor establishes the hours of work in the Weekly-Look Ahead Schedule and the start of the day should be by mutual agreement. The contractor shall be charged for one day during the defined 24 hour period regardless of how many shifts are worked.

Section 1-08.5 grants the Contractor the right to protest working day determinations and working day charges determined by the Engineer. In the event the Contractor submits the required written protest within 10 calendar days following the date of the statement, the Project Engineer will analyze the information provided, and respond to the Contractor by either denying the protest or revising the Weekly Statement of Working Days.

The Project Engineer will complete Weekly Statements of Working Days throughout the course of the project, showing workable, nonworking and unworkable days as they occur. These statements will continue to be completed until the project has reached Substantial Completion and the Working Days assigned to the contract have been exhausted. Following are the three possible scenarios:

- The working days are exhausted prior to reaching Substantial Completion. Weekly Statements of Working Days continue until Substantial Completion.
- The working days are exhausted on the day Substantial Completion is achieved. Weekly Statements of Working Days cease upon Substantial Completion.
- The working days are not exhausted upon reaching Substantial Completion. Weekly Statements of Working Days continue until the working days are exhausted or until physical completion.

Upon Substantial Completion the Project Engineer will ensure that the date is entered into CCIS and is noted in the remaining Weekly Statements of Working Days. After Weekly Statements have stopped, comments concerning weather and other events beyond the Contractor’s control should be entered into the project diary. The effect of these conditions on remaining work and on the scheduled completion should also be noted.

If contract time is expressed in calendar days, then Section 1-08.5 becomes difficult to interpret and the contract special provisions will provide guidance for the charging of contract time.

1-2.5C Suspension of Work

When, in the judgment of the Project Engineer, inclement weather, or conditions caused by inclement weather, make it impracticable to achieve satisfactory results on a critical item of work, an order should be issued to suspend the affected portions of the contract work or the entire project. If at all possible, suspensions for weather should be made with the concurrence of the Contractor. If the Contractor does not agree to a weather suspension, the Project Engineer should consult with the Region Construction Manager before issuing a unilateral suspension.

In addition, subject to the agreement of the Contractor and the approval of the Regional construction manager, delays caused by other conditions beyond the control of the Contractor may also warrant an order to suspend work.

During suspensions of long duration, for example a winter shutdown, the publication of Weekly Statements may be suspended. Notices to suspend or resume work should be written. Forms 421-006 and 421-007 have been developed for this purpose. A letter may accomplish the same purpose. If it is determined that some items of noncritical work on the project could be continued unaffected by weather conditions, then those items may be excluded from the order to suspend work. The prime consideration for unworkable days or suspensions is always the ability to work on critical items.

In the event that a suspension of work for weather or for other reasons beyond the control of the contractor is necessary for an extended period of time, the Project Engineer may recommend that the Contractor be relieved of routine maintenance during the period of suspension. Before WSDOT will assume the responsibility for maintenance, the Contractor must have taken all necessary actions to control erosion, pollution, and runoff prior to, and during, the shutdown period. The extent of the project area that will be maintained by WSDOT is the subject for a three party negotiation and agreement among the Project Engineer, the Maintenance Superintendent and the Contractor.

The suspensions described above are related to weather or other causes beyond the control of the Contractor. They apply only to critical work items and, therefore, always result in a determination of an unworkable day. If the Engineer and the Contractor agree to stop working on a noncritical item for one of these causes but to continue critical work, then the agreement should be noted in the records and weekly statements should be issued in the normal fashion.

The contract also gives the Engineer the right to suspend work on any part of the project when the Contractor is not complying with the contract's terms or the orders of the Engineer. This would be a significant action and, except in an emergency situation, should not be undertaken without the full and informed consent of the Region Construction Manager and the State Construction Office. If work is suspended under this contract provision, then weekly statements and the charging of workable days will continue in the normal fashion.

1-2.5D Extension of Time

In general time extensions are appropriate whenever the critical work is delayed due to an action or inaction of the contracting agency, or by a cause that is not the responsibility of the Contractor. Section 1-08.8 of the *Standard Specifications* includes a list of reasons that entitle the Contractor to a time extension, and a list of reasons for which no time extension will be granted. In all cases, the change or delay must delay critical work or an extension is not appropriate.

The contract requires the Contractor to identify a delay within 10 working days. If a delay is readily identifiable, the Project Engineer should enforce this provision. If the delay is not immediately apparent the time extension discussion should take place as soon as the delay is recognized. Before discussing a potential delay for which adequate notice was not given, the Project Engineer should discuss the situation with the Region Construction Manager to seek guidance. The Contractor should be encouraged to identify delays and bring them to the State's attention at the earliest opportunity. This allows the contracting agency to mitigate the delay by adding time, modifying the work or recovering the schedule. In the interest of actively managing a delay the project engineer may act unilaterally to address time if the contractor avoids the discussion.

If possible, all time associated with work added by change order should be addressed as part of the change order. If you are unable to come to agreement on the number of working days to add, the Region Construction Manager should be consulted concerning the need to unilaterally add time to the contract. Deferring the discussion of time in a change order to a later date should be a last resort. If the contractor is not granted time for an item, they are required to complete the contract in the number of working days that remain. This may require that the contractor to accelerate their efforts, by adding additional crews, equipment or working longer hours or extra days. If these actions are taken as a result of the contracting agency not granting time extensions when the contractor is entitled to them, the cost for these items would be paid by the contracting agency. If you do choose to defer the time discussion to later, set a time frame during in which the decision will be made.

The State has a responsibility to inform the Contractor's surety whenever increased time is being considered and the current extension, combined with previous extensions, would exceed 20% of the original allotted time in the contract. This information could be represented by the Surety's signature on the change order that adds time, by a separate letter from the Surety, or by a notice letter direct to the Surety office. Such notice and surety consent is a legal requirement and will help maintain the State's rights to be protected by the performance bond.

Section 1-08.6 of the *Standard Specifications* provides under what circumstances the Contractor may be entitled to compensation. Anytime that a project is delayed for any cause, the Project Engineer and the Contractor should consider methods of mitigating the delay damage. A common approach is to pursue schedule recovery by allocating additional resources to the work to get the project back on schedule. When the Project Engineer suspects that the State may be responsible for the delay, then compensation for the mitigation efforts may be proposed.

Any time extension will be documented either in a change order with approval levels defined in Section 1-2.4C of this Manual or in a letter to the Contractor from the State Construction Office.

1-2.5E Substantial Completion

Substantial Completion may be granted when only minor, incidental items of work, replacement of temporary facilities or correction remain in order to physically complete the contract. In determining Substantial Completion, the Project Engineer should consider whether or not:

- The public has full use and benefit of the facility.
- Major safety features are installed and functional, including guardrail, striping, and delineation.
- Illumination, if required, is installed or a temporary system with equal functional capabilities is operating.
- Signals, if required, are installed or a temporary system with equal functional capabilities is operating.

- The need for temporary traffic control on a regular basis has ceased. Only minor traffic restrictions will be needed for the remaining work.
- The traffic is operating in its permanent configuration.

The Project Engineer is responsible for determining the Substantial Completion date. When this has been done, the Contractor will be notified by letter, specifically noting the date on which Substantial Completion was achieved.

1-2.5F Date of Physical Completion

The date on which the Project Engineer determines that all physical work has been completed is noted and then established as the date of Physical Completion. The Project Engineer will immediately notify the Contractor by letter of the date determined for Physical Completion. Copies of the letter will be sent to:

- The State Program Management Office.
- The Railroad companies, if applicable.
- The State Accounting Services Office.
- The Regional Local Programs Engineer on all city and county projects.
- The State Roadway Data Office, MS 47380.
- Any other distribution that the Region deems appropriate.

Actions the Project Engineer should consider taking once Physical Completion has occurred include:

- Initiate a discussion of contract time.
- Identify any unresolved disputes and initiate discussions.
- Initiate a full review of item quantities, seeking contractor concurrence.
- Initiate a final review of materials documentation.
- On Federal-aid projects, initiate a Stewardship Final Inspection and Acceptance.

1-2.5G Liquidated Damages

Liquidated Damages must be resolved before the final estimate can be completed and processed. Guidance for assessing Liquidated Damages can be found in Section 1-08 of the *Standard Specifications*, and in some cases, in the contract provisions.

Any withholding or assessment made against the Contractor's payments, is to be preceded by a fair notice written communication to the contractor. For those issues that could be remedied with actions taken or initiated by the Contractor, this notice should also include a reasonable period of time that will allow the contractor to take action to mitigate or completely avoid the withholding or assessment.

The term "withhold" refers to a temporary deduction shown on a progress estimate. The term "assess" refers to a permanent deduction that could be shown on a progress estimate, but will be shown on the final estimate. Liquidated damages fall into two categories — one deals with contract

time and the other deals with miscellaneous provisions such as ramp or lane closures. These two categories are described below.

1-2.5G(1) Contract Time Liquidated Damages

Section 1-08.9 of the *Standard Specifications* (and, at times, the contract provisions) establishes the amount of Liquidated Damages to be assessed the Contractor for overruns in contract time. These assessments are either: (1) the formula calculated liquidated damages, or the liquidated damages prescribed by the contract provisions; or (2) the direct engineering and related costs. All temporary withholding or final assessment of these Liquidated Damages are to be shown as a below the line "Liquidated Damages" deduction on progress estimates and the final estimate.

The State Construction Engineer has not subdelegated to the Region the authority to assess time related damages on progress estimates or the final estimate. However, the authority to withhold below the line "Liquidated Damages" on progress estimates has been subdelegated to the Regions, and may be further subdelegated to the Project Engineer. See Section (5) of this manual. Liquidated Damages should be addressed whenever it is apparent that the number of working days provided in the contract will be used before Substantial Completion. It is emphasized once again that fair notice and communication is necessary as a legal requirement.

In some cases, there are legitimate reasons for time extensions which would preclude withholding liquidated damages on progress estimates. If the Project Engineer is aware of or anticipates a possible time extension that would preclude withholding liquidated damages on progress estimates, the Region and/or the State Construction Office should be consulted for guidance. If the Project Engineer determines that withholding of liquidated damages on progress estimates would not be appropriate, the reasons for not withholding are to be documented by a memorandum to the files. The following describes the procedures for addressing contract time related liquidated damages in the various stages or phases of the project:

- Phases (Interim Physical Completion Dates). Liquidated damages for phases will be shown in the special provisions. When the contract includes additional phases, and the time for physical completion of a phase has overrun, the overrun should be resolved as it occurs. This involves the Contractor either being granted an extension of time or being assessed liquidated damages by the State Construction Office.
- After Substantial Completion Date of the Contract. If substantial completion is granted after the expiration of contract time the formula for liquidated damages in Section 1-08.9 of the *Standard Specifications* will be assessed for that period of time between the expiration of contract time and the substantial completion date. Liquidated damages assessed after the date of substantial completion will be only those costs identified as Direct Engineering and related costs that have been incurred by WSDOT. The direct engineering and related costs are defined as field engineering and inspection time charges plus any vehicle, travel pay, per diem, or other charges connected with the delayed

contract physical completion. Engineering costs such as computing grades, quantities, etc. which would have been incurred by WSDOT under normal conditions should not be included in the determination of direct engineering and related costs. If substantial completion is granted on or prior to the expiration of contract time, direct engineering costs will only be assessed for that period of time between the date contract time expired and the physical completion date.

- Before Physical Completion. If Substantial Completion has not been established, the formula for Liquidated Damages in accordance with Section 1-08.9 of the *Standard Specifications*, will be assessed for that period of time between the expiration of contract time and the Physical Completion date.

Working days added to the contract by time extensions when time has overrun shall only apply to the days on which Liquidated Damages or Direct Engineering have been charged, such as:

- If Substantial Completion has been granted prior to all of the authorized working days being used, then the number of days in the time extension will eliminate an equal number of days on which Direct Engineering charges have accrued.
- If the Substantial completion date is established after all of the authorized working days have been used, then the number of days in the time extension will eliminate an equal number of days on which Liquidated Damages or Direct Engineering charges have accrued.

1-2.5G(2) Miscellaneous Liquidated Damages

The contract provisions may provide for assessment of other liquidated damages, such as failure to open traffic lanes within the prescribed time or failure to open ramps within the prescribed time. Any temporary withholding or final assessment of these liquidated damages shall be shown as a below the line "miscellaneous" deduction on progress estimates and the final estimates. The State Construction Office has subdelegated the authority to the Regions to withhold and assess these types of liquidated damages on progress estimates and the final estimate. The Project Engineer shall notify the Contractor in writing when these types of liquidated damages are to be assessed.

1-2.5H Completion Date

Immediately after the Physical Completion date has been established, the Project Engineer is to notify the Contractor of all outstanding documents that are required in order to establish a project Completion Date. Once all the obligations of the contract have been performed by the Contractor, the Project Engineer will provide the Contractor written notice of project completion, identifying the Completion Date established for the contract.

In order for the project Completion Date to be established, all the physical work on the project must be completed, and the Contractor must have furnished all documentation required by the contract, contract provisions, and the *Standard Specifications*. This includes the signed Final Contract Voucher Certification. (Note: Establish the

Completion Date as soon as the last item of paper work is received. The final estimate does not have to be processed in order to establish the Completion Date.) the notice to the Contractor should be prepared and mailed on the same day that is designated as the completion date. A copy of the completion letter must be faxed to the contract payments section of the State Accounting Services Office, (fax number (360)705-6804) on the day the letter is written.

If the Contractor refuses, or is unable to return, a signed FCVC or any of the required documents, the Project Engineer, the Region and the State Construction Office can work together to move the project towards closure by establishing a unilateral completion date allowing WSDOT Acceptance of the contract. See Chapter 1-3.1D for Unilateral Acceptance procedures.

1-2.6 Enforcement of Wage Rate Requirements

1-2.6A General Instructions

Section 1-07.9 of the *Standard Specifications* outlines prevailing wage responsibilities for the Contractor, subcontractors, lower-tier subcontractors, agents or any other persons performing work under the contract. Additionally, contracts financed in whole or in part with federal funds have the *Required Contract Provisions for Federal-aid Construction Contracts* (FHWA-1273) included in the contract documents. These provisions identify additional federal wage requirements.

Contracts that are financed by either state or federal funds, or both, will include specific Hourly Minimum Wage Rates and Fringe Benefit schedules from either or both the Washington State Department of Labor and Industries (State L&I) and the United States Department of Labor (USDOL). When both state and federal funds are involved and there is a difference between the two prevailing wage determinations, the Contractor, subcontractors, and lower-tier subcontractors must pay a wage of not less than the higher of the two in order to remain in compliance with both prevailing wage laws. Comparisons that are made between state and federal wage rates must include their corresponding fringe benefits as identified in their respective state or federal wage determinations.

1-2.6B Monitoring of State Requirements

The requirements for the Contractor's compliance with State prevailing wages are noted in Section 1-07.9 of the *Standard Specifications*. Specific wage rate determinations for State prevailing wages are noted in the contract itself. Though certified payrolls can be requested regardless of the contract's source of funds, these are a specific requirement for enforcement of federal wage laws only and are not routinely used for monitoring of State prevailing wage issues.

Requirements for State prevailing wages include:

- Section 1-07.9 requires that the Contractor submit a *Statement of Intent to Pay Prevailing Wages* (SI) prepared on the State L&I form and approved by that agency. Statements are required for the Contractor and for each subcontractor, agent and lower-tier

subcontractor. The specification requires that no progress payments be released to the Contractor for work completed by the Contractor, or for portions of work completed by subcontractors, agents or lower-tier subcontractors prior to the Project Engineer's receipt of the approved statement for the entity performing the work. State L&I will approve the statements and further certify that the documents meet the requirements of State laws.

- After the project has been accepted by WSDOT, the Contractor, all subcontractors, and all lower-tier subcontractors must submit an *Affidavit of Wages Paid* (AWP) prepared on the State L&I form and approved by that agency. (The form may be submitted earlier by a subcontractor or lower-tier subcontractor should that firm's work be completed prior to acceptance.) It is the Contractor's responsibility to obtain and provide all AWP to the Project Engineer for all subcontractor and lower-tier subcontractors performing work on the project. In the event a subcontractor or lower-tier subcontractor cannot or will not provide a completed AWP form, the Contractor should consult or seek guidance from State L&I. Failure to provide all required AWP for all contractors who worked on the project will result in continued withholding of the prime Contractor's retained percentage.
- A contractor or subcontractor may enter into an agreement with his or her employees to work 10 hours per day without having to pay overtime. This is provided that no employee work more than 4 calendar days a week.
- State L&I has also defined "Contractor" to include some fabricators or manufacturers who produce nonstandard items specifically for use on the public works project. Additionally some companies who may contract with the Contractor, subcontractors, or lower-tier subcontractors for the production and/or delivery of gravel, concrete, asphalt, or similar materials may perform activities that cause employees of these firms to be covered by state prevailing wage laws.

Specific circumstances that may cause employees of these firms to be covered by State prevailing wage laws are described in State L&I publications. These publications are included in the provisions of each contract adjacent to the State Prevailing Wage listings. Where these firms are covered by State prevailing wage laws, an approved *Statement of Intent to Pay Prevailing Wages* and *Affidavit of Wages Paid* must be submitted to the Project Engineer on State L&I forms.

The Project Engineer should monitor the Contractor's efforts in regards to state prevailing wages by:

- Monitoring to ensure an approved Statement of Intent is received prior to releasing any progress payments for work completed by the Contractor, subcontractor or lower-tier subcontractors as well as any fabricators or suppliers of materials whom L&I may also determine as being covered.
- Monitoring to ensure that Affidavits of Wages Paid

have been received for the Contractor as well as each subcontractor or lower-tier subcontractor who performed work on the contract. In addition, AWP are also required of each fabricator or supplier who was also covered by state prevailing wages.

- Monitoring by observing concerns of employees of the Contractor, subcontractors, or lower-tier subcontractors. In particular, the Project Engineer should note any employee complaints regarding specific state prevailing wage violations by the employer.

In the event the Project Engineer identifies or receives a complaint from any employee of the Contractor regarding improper application or nonpayment of state prevailing wages, or improper application of overtime pay, the Project Engineer should immediately notify the Contractor requesting prompt corrective action. All issues of noncompliance involving either the Contractor, subcontractor, and any lower-tier subcontractors are to be addressed through the Prime Contractor for resolution.

Once the Contractor has been informed that an apparent violation of state prevailing wages has occurred, it is expected that a satisfactory correction or explanation will be made within a reasonable period of time. If this does not happen, the Project Engineer should inform the Contractor that the matter may be referred to the Washington State Department of Labor and Industries (L&I) for further action. If the failure to act continues, the Project Engineer should refer the issue to the Region Construction Manager.

Except as noted for missing Statements of Intent, routine monthly progress payments made to the Contractor for work completed should not be deferred for enforcement of state prevailing wage laws. The State Construction Office will refer the matter to State L&I for further investigation that may be appropriate. Should State L&I choose to investigate, L&I will establish the amount of any unpaid wages due employees of the contractor. In order to recover these wages for employees, L&I may choose to file a claim against the Contractor's retainage held under the contract. State L&I may also choose to recover unpaid wages by requesting that the Project Engineer withhold funds from monthly progress estimates for work completed by the Contractor.

1-2.6C Enforcement of Federal Prevailing Wage Provisions

In addition to the requirements of Section 1-07.9 of the *Standard Specifications*, all contracts financed with Federal-aid funds include the *Required Contract Provisions for Federal-aid Construction Contracts* (FHWA-1273). These provisions identify federal wage requirements. The federal prevailing wage requirements included in these provisions are also commonly referred to as Davis Bacon and Related Acts (DBRA). It is the responsibility of the Project Engineer to both monitor and enforce these provisions to the degree necessary to ensure full compliance. In order to comply with these requirements, the Contractor must:

- Submit weekly certified payrolls to the Project Engineer for themselves, each subcontractor, and each agent or lower-tier subcontractor. These consist of copies of weekly payrolls along with a signed Statement of Compliance.

- Post wage rate posters.
- Post the wage determinations of the United States Secretary of Labor. These determinations consist of the listing of Federal Wages that are included in the provisions of each contract.
- Allow interviews of employees during working hours by authorized representatives of WSDOT, the Federal Highway Administration, and the U.S. Department of Labor.

The prime Contractor is ultimately responsible for all subcontractor, agent, or lower-tier subcontractor compliance with the requirements for federal prevailing wages.

1-2.6C(1) Federal Prevailing Wage Rates

The Contractor must post the federal wage determination, consisting of the wage listing included in the contract provisions, in a prominent place where it can easily be seen by workers. Standard posters (forms FHWA 1495 and FHWA 1495A) are also to be posted and are available to the Region from the Support Services Supervisor, FHWA, Olympia, Washington. Form FHWA 1495A is printed in Spanish and is to be posted when the project is in an area where there is a possibility that some workers may speak only Spanish.

1-2.6C(2) Certified Payroll Inspection

The “Contract Provisions for Federal-Aid Construction Contracts” (FHWA-1273) require the Contractor, subcontractors, agents or lower-tier subcontractors to submit certified payrolls. These are to be checked by the Project Engineer to ensure the required information has been included and is correct. The Project Engineer should accomplish this by making a complete check of the first payroll submitted on the project by the Contractor, each subcontractor, and each lower-tier subcontractor. Once satisfied that these first payrolls are correctly prepared, subsequent payrolls for that project may be accepted by a random spot checking of approximately 10 percent of the payrolls submitted. If errors are found during any spot-checking of the payrolls, a more complete or thorough check should occur until the Project Engineer has determined that the errors detected have been corrected and monitoring can be returned to a spot checking basis. The *Contract Provisions for Federal-Aid Construction Contracts* (FHWA-1273) identify the required items to be included in certified payrolls. A complete payroll inspection by the Project Engineer should confirm that the following items are present:

- The contract number and contract name noted on the payroll form, together with the payroll number and payroll period. The name of the employer, identifying the Contractor, subcontractor, or lower-tier subcontractor, must be shown.
- A specific minimum wage rate is to be identified for each worker. The *Standard Specifications* require the Contractor to use word descriptions for the labor classifications that are included in the contract provisions identifying federal wage rates, and are to be used on all payrolls. Section 1-07.9 of the *Standard Specifications* permits the Contractor to use

an alternative method to identify or correlate the labor descriptions used in order that they may be compared to the contract provisions.

- Each employee’s Social Security number and permanent address must appear on the first payroll on which their name appears, or on a separate list attached to the payroll. Changes in address must be reported.
- Payroll deductions must conform to the “Anti-Kickback” Act noted in the *Required Contract Provisions for Federal-aid Construction Contracts* (FHWA-1273). If payroll deductions are questionable, contact the State Construction Office for assistance.
- Every laborer or mechanic working on the contract must be classified for the proper minimum prevailing wage in accordance with the designated wage determination. If a classification of worker is used that does not appear in the contract special provisions, Section 1 07.9 of the *Standard Specifications* makes it the Contractor’s responsibility to contact the U.S. Department of Labor for a determination of the proper wage rate. The *Required Contract Provisions for Federal-aid Construction Contracts* (FHWA-1273) provides a method for resolving this.
- All payrolls must have a statement of compliance signed and in the form prescribed by Section V of the *Required Contract Provisions Federal-aid Construction Contracts* (FHWA-1273).
- The Contractor, subcontractor, or lower-tier subcontractor, in accordance with the requirements of DBRA, must certify all payrolls. This certification contains four elements:
 - That the payroll copy furnished is a true copy;
 - That the payroll is correct and complete;
 - That the wage rates contained therein are not less than those determined by the Secretary of Labor, and that the classification set forth for each laborer or mechanic conforms with the work being performed; and
 - That the appropriate fringe benefits due each employee have been paid in full.

Subcontractors and lower-tier subcontractors are required to submit payrolls through the Prime Contractor to the Project Engineer. Any payrolls which do not comply fully with the requirements outlined above must be corrected by a supplemental payroll.

1-2.6C(3) Employee Interviews

The Project Engineer must conduct periodic employee interviews. The purpose of these spot interviews is to establish, with reasonable certainty, that the provisions for federal prevailing minimum wages are being complied with and that there is no misclassification of workers or disproportionate employment of laborers, helpers, or apprentices. The occupation description must be shown on the form used for the employee interview noted under current duties. The occupation description is noted in the wage listing included in the contract provisions.

Some employees may refuse to reveal their rate of pay. This is acceptable and should be noted in the remarks column. Many employees do not know or may guess at the rate. If possible, a determination of the accuracy of the stated rate should be made, and any uncertainty noted in the remarks column to reduce the need for follow up interviews. If either the stated rate (from the employee) or the record rate (from the certified payroll) is below the minimum rate (from the contract wage listing), an investigation by the Project Engineer must be conducted. The investigation may be as simple as a follow up interview with the employee or a more in depth investigation may result in a requirement for a supplemental payroll. In any event, the matter must be resolved so that the employee interview report describes what corrective action was taken to ensure that the employee has been paid the minimum prevailing wage rate. This corrective action is to be reported under remarks on the form or by attached memo if more space is needed. All discrepancies found must be resolved.

The frequency and extent of these interviews should be sufficient to ensure a representative sampling has been made for all classes of workers employed on the contract. A minimum sampling should include employees of the Contractor and all major (30 percent or more of the contract dollars) subcontractors. The interviews should be made with such frequency as may be necessary to ensure compliance. Employee Interview Report, Form 424-003, is used to record and report interviews.

1-2.6C(4) Complaints

Any complaints regarding violations of minimum wage rate regulations that are referred to the Project Engineer by employees of the Contractor, subcontractor, or lower-tier subcontractors should be treated as confidential, and should be promptly investigated by the Project Engineer. If there are questions regarding complaints and the application or interpretation of the federal prevailing wage provisions, the Project Engineer should consider referring the issue to the Region Construction Manager or contacting the State Construction Office for further assistance.

1-2.6C(5) Federal Prevailing Wage Violations

In the event the Project Engineer identifies or receives a complaint from any employee of the Contractor regarding improper application or nonpayment of federal prevailing wages, improper application of overtime pay, or any other requirement noted in the *Required Contract Provisions for Federal-aid Construction Contracts* (FHWA-1273), the Project Engineer should immediately notify the Contractor requesting prompt corrective action. All issues of noncompliance involving either the Contractor, subcontractor, and any lower-tier subcontractors are to be addressed through the prime contractor for resolution.

If the Project Engineer determines the Contractor is in violation of the provision noted in the FHWA 1273 or Section 1-07.9 of the *Standard Specifications*, the Contractor should be immediately informed and requested to make the necessary corrective actions. Once the Contractor has been informed that an apparent violation has occurred, it is expected that a satisfactory correction or explanation will

be made within a reasonable period of time. If this does not happen, the Project Engineer should withhold an appropriate portion of payment (see 1-3.1B(9)). If the failure to act continues, the Project Engineer should refer the issue to the Region Construction Manager.

1-2.6C(6) Department of Labor Investigation

The U.S. Department of Labor may investigate compliance with the DBRA and the Contract Work Hours and Safety Standard Act (CWHSSA) when conducting any investigations relative to compliance with the Fair Labor Standards Act or any other acts under its enforcement authority. Investigative action taken by the U.S. Department of Labor with respect to DBRA and CWHSSA do not, in any way, change the degree of authority or responsibility of WSDOT for enforcement of these Acts. Any actions taken by the U.S. Department of Labor should be considered as services we may use to assist us in our enforcement activities but, should not be considered to relieve us of our basic responsibility to investigate fully all potential violations and to apply such sanctions as are deemed applicable under our enforcement authority to ensure compliance.

1-2.6C(7) Fraud Notice Poster

Fraud Notice, FHWA 1022, Title 18 USC 1020, must be displayed on all Federal-aid projects during the course of the work. This notice points out the consequences of any impropriety on the part of any contractor or WSDOT employee working on the project.

1-2.6C(8) Request For Authorization of Additional Classification and Rate

The U.S. Department of Labor (DOL) issues wage determinations under the Davis-Bacon Act (DBA) using available statistical data on prevailing wages and benefits paid in a specific locality. On occasion, the data does not contain sufficient information to issue rates for a particular classification of worker needed in the performance of the contract. Because of this, DBA provisions contain a conformance procedure for the purpose of establishing an enforceable wage and benefit rate for the missing classification (reference Standard Specification 1-07.9(1) and FHWA 1273).

Contractors are responsible for determining the appropriate staffing necessary to perform the contract work. Contractors are also responsible for complying with the minimum wage and benefits requirements for each classification performing work on the contract. If a classification considered necessary by the contractor for performance of the work is not listed on the applicable wage determination, the contractor must initiate a request for approval of an additional classification along with the proposed wage and benefit rates for that classification.

The Contractor initiates the request by preparing form SF1444, Request for Authorization of Additional Classification and Rate, at the time of employment of the unlisted classification. (Reference FAR 22.406-3 and 52.222-6(b), and Title 29 CFR Part 5, Section 5.5(a)). The Contractor completes blocks 2 through 15 on the form. Standard Form 1444 is readily available via the internet and

is accessible at <http://www.wdol.gov/library.html>, under the heading “Conformance”.

The Contractor submits the request to the Contracting Officer (HQ Construction) via the Project Engineer’s office. The Contracting Officer reviews the request for completeness and signs the form designating the contracting agency’s concurrence or disagreement with the Contractor’s proposal. If the Contracting Officer indicates disagreement with the Contractor’s proposal, a statement must be attached supporting a recommendation for different rates. The Contracting Officer then submits the proposal with all attachments to DOL for approval. The Contractor is obligated to pay the proposed wage and benefit rates pending a response from DOL.

1-2.7 EEO, D/M/WBE and Training

1-2.7A Overview

Differences between State and Federal laws require a variety of guiding requirements. As a result individual contracts may have different guiding requirements depending on what laws were in place at the time the contract was executed and how the project is funded. The special provisions, *Standard Specifications*, and amendments determine the specific requirements for each project. The *Construction Manual* is one of many resources available for general information on the obligations and policy of WSDOT with regard to external civil rights. Other resources include:

1. Office of Equal Opportunity (OEO): OEO monitors, maintains, and updates WSDOT Equal Employment Opportunity (EEO) policies and commitments to FHWA. As part of that effort they maintain the following documents which are available through the OEO homepage:
 - Equal Employment Opportunity Compliance Program (EEO and on the Job Training)
 - Disadvantaged Business Enterprise Participation Plan (contract goals, if included in a project, will be mandatory)
 - Title VI Plan (nondiscrimination)
2. *Standard Specifications*, as follows, apply to all projects:
 - 1-07.11 Requirements for Nondiscrimination
 - 1-08.1 Subcontract Completion and Return of Retainage Withheld
3. General Special Provisions as may be included in the contract include:
 - Minority and Women’s Business Enterprise (MWBE) Participation (included in projects financed with only State funds)
 - Requirement for Affirmative Action to Ensure Equal Employment Opportunity (included in projects with FHWA participation)
 - Disadvantaged Business Enterprise Participation (included in projects with FHWA participation)
 - Special Training Provisions (included in projects with FHWA participation and only if the contract is selected for training)

- Indian Preference and Tribal Ordinances (TEROs) (only if the project includes work on the reservation and only if the ordinances exist)

While some requirements and provisions apply to all projects, others apply to projects with State funds only and others yet apply to projects that are partially or fully financed with Federal funding.

1-2.7B EEO (Federally Funded Projects)

WSDOT has committed to FHWA to perform comprehensive construction compliance reviews to ensure that the requirements of Section 1-07.11 have been adhered to. This review is performed by the OEO on a selected number of FHWA funded projects and may take place at any point during the life of the project or after the project has been completed. A contractor that is found in violation of the contractually required affirmative action good faith efforts will be invited to a compliance conference to develop a corrective action plan. Failure to accept and comply with a corrective action plan may result in sanctions. The records that have been maintained at the Contractor’s office will be utilized for these reviews. The FHWA also retains the authority to review the Contractor’s records for EEO compliance. These reviews do not normally involve the project office other than notification of their occurrence and the resulting findings.

1-2.7B(1) Prompt Return of Retainage to All Subcontractors

As a condition of receiving Federal funding, WSDOT is required to ensure prompt payment to all subcontractors on all contracts regardless of funding. State statutes (Revised Code of Washington, RCW) pertaining to prompt pay require that the contracting agency make prompt payment to the prime contractor and that the prime contractor, in turn, pass these payments on to subcontractors in a timely manner.

Return of the subcontractor’s retainage held by the prime contractor is required by the *Standard Specifications*. This is a race neutral effort intended to support and encourage all small businesses. Therefore, in accordance with the contract provisions, the prime contractor is required to release any and all retainage to the subcontractor within a designated time period after subcontract completion. The Project Engineer has no role in this process other than to respond to allegations of non-compliance with this contract requirement as with any other. We need to keep in mind that our contract is with the prime contractor and as a result, we are not a party to the prime contractor’s subcontract documents. We should avoid becoming involved in prime’s relationship with their subcontractors.

In the prime contractor’s effort to determine completion of subcontract work, as required by the contract provisions, the Project Engineer may be asked to determine completion of a portion of the work. While we need to work with the Contractor to comply with the requirements of the specification, we should also take specific care to not issue partial punch lists or to place ourselves in a position of “accepting” portions of the work. In some cases we may provide the Contractor relief under certain conditions as described in Section 1-07.13 of the *Standard Specifications*, “Contractor’s Responsibility for the Work.”

1-2.7C EEO (State Funded Projects)

The Contractor is required to comply with the EEO requirements detailed in the *Standard Specifications* Section 1-07.11, Requirements for Nondiscrimination. In general, these requirements include having an EEO officer, developing, maintaining, making known, and utilizing an EEO program. The Project Engineer should be alert for and respond to any indications or accusations of discrimination and if substantiated, take appropriate actions. The Office of Equal Opportunity and your regional OEO staff are available for guidance and assistance in these types of situations.

1-2.7D EEO (Federally Assisted Projects)

The requirements for EEO and nondiscrimination for federally assisted contracts are similar to what's required for State funded projects. However, additional monitoring, reporting, and authority are mandated by Federal laws as noted in the Federal contract requirements known as the "FHWA 1273." The "FHWA 1273" is included in every Federally assisted contract. These requirements are reiterated in the *Standard Specifications* Section 1-07.11, Requirements for Nondiscrimination.

Reporting

- Federal-Aid Highway Construction Contractors Annual EEO Report, Form FHWA - 1391 — This form is required for all Federally assisted projects provided the prime contract is equal to or greater than \$10,000 and for every associated subcontract equal to or greater than \$10,000. Each contract requires separate reports be filed for the prime contractor and each subcontractor (subject to the above noted criteria.) These forms are due by August 25th each year in which work was performed in the month of July.

The payroll period to be reflected in the report is the last payroll period in July in which work was performed. A contractor who works on more than one Federally assisted contract in July is required to file a separate report for each of those contracts. For multi year projects, a report is required to be submitted each year work was performed during the month of July throughout the duration of the contract. A responsible official of the company must sign the completed report.

Upon receipt, the Project Engineer will forward this annual report to the Region's EEO Officer by September 17th. The Region EEO staff at the direction of the OEO will compile and report the information noted on the forms. The figures reported must reflect the number of employees, not hours, in each category, with subtotals broken out for women and minorities and grand totals for the category. Tables A through E reflect both apprentices and on the job trainees that were also utilized within each trade. The form must also include the corresponding subtotals in each category, A through E, broken out by both women and ethnicity.

- Summary of Employment Data Report, Form FHWA - 1392 — the WSDOT Office of Equal Opportunity (OEO) has developed a program for the reporting of WSDOT's EEO accomplishments. This

program, Equal Employment Opportunity Contractor Compliance Program, requires WSDOT to submit a summary of employment data to FHWA for each Federal fiscal year. This Summary of Employment Data Report, [FHWA-1392](#), is prepared from forms [FHWA-1391](#) (project specific annual reports) that have been submitted to the Region by the Project Engineer's offices. This summary is prepared by the Region EEO lead or other Region designee for each Federally assisted project. This reporting also includes Local Agency projects administered through the Region's Highways and Local Programs offices. The completed [FHWA-1392](#) summary reports, including all forms [FHWA-1391](#), are then submitted by the Region EEO lead to the WSDOT Office of Equal Opportunity by September 24th each year.

- Monthly Employment Utilization Reports, WSDOT Form - 820-010 — This form, or approved substitute, is required for all federally assisted projects if the prime contract is equal to or greater than \$10,000 and for every associated subcontract equal to or greater than \$10,000. This report includes the total work hours for each employee classification as well as the total number of employees, broken out by ethnicity, in each trade, for each WSDOT project. Instructions for completing the form can be found on the back of the form itself. These monthly reports are to be maintained by the Contractor in the respective prime or subcontractor's records for a period of three years from acceptance of the contract.

The information required by WSDOT Form 820-010 may be accepted in an alternate format provided that format contains all of the data required by and is completed in accordance with the instructions for WSDOT Form 820-010. The Region EEO staff should be consulted regarding the acceptability of any alternate format proposed by the Contractor.

Records Retention and Reviews

The Contractor is required to maintain all project records, including the aforementioned EEO records, for three years following completion of the contract.

1-2.7E Minority and Women Owned Business Enterprise (MBE, WBE)

MBE, WBE is the designation for holding State certification as a minority or women owned business enterprise. The State Office of Minority and Women's Owned Business Enterprises (OMWBE) certifies businesses as either a minority owned business (MBE), a women owned business (WBE), or a combination of both (M/WBE). On projects funded in whole or in part with State funds, the contract provisions will include a MBE, WBE special provision. This provision may specify voluntary goals for the Contractor's utilization of M/WBE. The provision also includes suggested methods for encouraging M/WBE participation. As noted, these requirements are indeed voluntary and there are neither preferences for accomplishment nor sanctions for noncompliance.

MBE/WBE Reporting

- Annual Report of Amounts Paid MBE/WBE Participants (Form 421-023). In accordance with Section 1-08.1 of the *Standard Specifications*, an Annual Report of Amounts Paid MBE/WBE Participants (Form 421-023) is required from the prime Contractor for all projects funded entirely by State funds. When a project contains Federal assistance, the Federal quarterly reporting requirements for DBE utilization override the States requirements, eliminating the need for the State's annual report of amounts paid.

This Annual Report of Amounts Paid MBE/WBE Participants report reflects the State fiscal year, July 1 through June 30, and is to be submitted to the Contracting agency by the 20th of July each year and/or upon physical completion of the contract. The dollar amounts shown in the report are those amounts paid to the MBE/WBE firms during the reporting period. The final report is to show only the dollar amounts paid since July 1st through the Physical Completion date. The Region is responsible for entering this data into CCIS. The Region Documentation/Equal Employment Opportunity (EEO) Officer needs to verify the information has been entered and validate the information. The completed form is maintained as a part of the project records and becomes a part of the temporary final records upon completion.

As an alternative to providing written submittals MBE/WBE participation can be reported through the Contract Monitoring And Tracking System (CMATS) on an ongoing basis. The project office will be contacted via email by the CMATS system when data is entered. The project office will need to review and accept the information prior to it entering the system. If the contractor is unfamiliar with the CMATS they may contact the WSDOT Office of Equal Opportunity (OEO) at (360) 705-7010 or, OMWBE at (360) 951-4916, and request information and assistance in getting started. Region Documentation/EEO Officers will need to insure that the CMATS system has designated the appropriate party responsible for review and is accepting the information as new contracts come on line within the Region. The Responsible party is either the Project Engineer or their designee. The Region Documentation/EEO Officers will also need to verify information was received and validate the information. The use of CMATS will be required after January 7, 2008.

1-2.7F Disadvantaged Business Enterprise (DBE)

DBE is the designation for holding Federal certification as a Disadvantaged Business Enterprise. On Federally funded projects there will normally be a DBE requirement of some sort specified by the contract special provisions. This special provision will be one of two types:

1-2.7F(1) GSP Includes No Goal

When *No Goal* is specified, the contractor is encouraged to take actions that promote DBE participation. The goal is intended to draw the bidders attention to the opportunity to subcontract with DBE's. However, these requirements are indeed voluntary and there are neither preferences for accomplishment nor sanctions for non-compliance. They do contribute to the overall goal established by the Department. It is therefore important that the Department capture the work that is being performed. This can be done either through CMATS or through "Quarterly Report of Amounts Credited as DBE Participation" up to January 7, 2008. After that date the information will be required to be submitted through CMATS.

1-2.7F(2) GSP Includes Condition of Award (COA) Goal

When a *Condition of Award Goal* (COA) is specified, the Contractor is required to employ DBE participation to at least the extent identified in the contract special provisions. This is a Condition of Awarding the contractor the contract and a project can not be considered successful unless a good faith effort has been made to deliver on the Condition of Award. These specifications are placed in contracts as a condition of continued Federal Funding for the Department.

- As a *Condition of Award*, the Contractor must commit to and follow through on; subcontracting at least the work and the amount identified by the COA to certified DBE firms or make a good faith effort to do so.
- Measurement of attainment is not simply the payments made to the DBE. Attainment is measured in accordance with the provisions of the "DBE Participation" section of the contract special provisions.
- Changes to the amounts specified for COA must be made in accordance with the procedures outlined in this section.

1-2.7F(3) Additional Execution Documents

Successful bidders will be required to provide a "Bidders List" to the Department. This list is to include the names and addresses of every firm that submitted a bid or quotation to the Prime, whether or not that bid was used as part of the overall proposal. The Contractor is directed to send this list directly to the WSDOT Office of Equal Opportunity in Olympia and normally the Project Engineer will have no involvement.

1-2.7F(4) DBE Reporting

The contract special provisions require the Contractor to submit to the Project Engineer a "Quarterly Report of Amounts Credited as DBE Participation" for each quarter and upon completion of the project. Again, the measurement is not simply the payments made to the DBE, rather it is in accordance with the "DBE Participation" section of the contract special provisions. This report should contain all DBE's utilized on the contract not just the COA DBE's. The information is used to track the Departments attainment of our overall goal and as such it is important to insure that they are received and processed. The Region Documentation/

EEO Officers shall track and verify that the affidavits are being received and entered for all applicable contracts. The Region Documentation/EEO Officers shall also compare the affidavits with the Condition of Award requirements.

As an alternative to providing the “Quarterly Report of Amounts Credited as DBE Participation” participation can be reported through the Contract Monitoring And Tracking System (CMATS) on an ongoing basis. The project office will be contacted via email by the CMATS system when data is entered, and it will need to be reviewed and accepted prior to it entering the system. If the contractor is unfamiliar with CMATS they may contact the WSDOT Office of Equal Opportunity (OEO) at (360) 705-7010 or OMWBE at (360) 951-4916, and request information and assistance in getting started. Region Documentation/EEO Officers will need to insure that the CMATS system has designated the appropriate party responsible for review and is accepting the information as new contracts come on line within the Region. The Responsible party is either the Project Engineer or their designee. The Region Documentation/EEO Officers will also need to verify that the information has been received and validate the information received. The use of CMATS will be required after January 7, 2008.

Information concerning the Contract Monitoring And Tracking System (CMATS) can be found on the Office of Minority and Women’s Business Enterprises (OMWBE) web site at <http://www.omwbe.wa.gov/>. CMATS has four elements to it, Biz Trak, Biz Web, Biz Net, and Biz Trans. of these, Biz Trak and Biz Web are the two that will be used to input data, Biz Trak is the actual computer application, Biz Web is an internet-based application that serves as a data entry facility for contractors. Biz Net is a listing of businesses and will allow contractors to locate businesses for a specific bid and to receive quote solicitation via the Internet. Biz Trans is a server based application that function as a gateway for the data extraction process from existing WSDOT systems.

1-2.7F(5) On Site Reviews

- **Contract Includes Condition of Award Goal** — on site reviews shall be conducted on contracts that include COA goals when the COA subcontractor starts work, during the peak period of the subcontractor’s work, and whenever there is a change in the nature or methods of the work. On site reviews are also required when a COA subcontractor is replaced. On site reviews are conducted on all DBE firms on the contract, not just the DBE firms subcontracted work under the COA. The intent of the overall program and hence the review is to document that the DBE is indeed in control of the work and performing a “*Commercially Useful Function*” (CUF) as described by the specification. The on site review is a “snapshot in time” and should record personal observations, documentation reviews, and personnel interviews as applicable. A copy of the completed on site review form (272-051) should be forwarded to the WSDOT Office of Equal Opportunity. The Condition of Award letter requires that the identified DBE firms perform specific item(s) of work for the estimated dollar amounts included in the proposal. The letter also

identifies whether a firm performs as a “subcontractor,” “manufacturer,” or “regular dealer.” DBE compliance issues should be brought to the attention of the Office of Equal Opportunity and the State Construction Office.

- **Contract Includes No Goal** — the state has an obligation to make sure the quarterly reports are accurate. Taking credit for DBE accomplishments in the reports requires that the DBE perform a commercially useful function. At least one on site review should be performed on all DBE firms.

1-2.7F(6) Changes to the Condition of Award (COA)

The Contractor is required to utilize the COA subcontractors, manufacturers, etc., to perform the work as listed in the COA letter. Substitution of another DBE is allowed if:

- A COA DBE firm becomes decertified, or
- The contractor proposes a change to the contract that reduces DBE COA participation, or
- The prime contractor provides documentation that a DBE firm is unwilling or unable to perform the work.

Exceptions to the substitution requirement may be allowed under any of the following circumstances:

- WSDOT deletes the COA firm’s intended work.
- The COA work accomplished under runs the original planed quantity.
- The contractor can show substantial financial loss if a substitution is required.
- The work has progressed to the point where no other work remains to be subcontracted.
- The DBE subcontractor has taken the positive step of graduating from the DBE program.

The State Construction Office must approve any substitution with concurrence from the Office of Equal Opportunity.

1-2.7F(7) Substitution

Substitutions must meet the following requirements:

- The new firm must do an equal dollar value of work on the contract.
- The change order does not increase the dollar amount of the original goal.

1-2.7F(8) Condition of Award (COA) Change Orders

Changes to the contract COA amounts must be made through a change order executed by the Headquarters Construction Office. Approval is granted after consultation with the Office of Equal Opportunity. This approval shall be accomplished ahead of the work being changed under the contract and any related work be accomplished. The amounts shown in the COA change order should be limited to the credit necessary to accomplish the original contract goal amount. The request for approval and the change order as well as the change order package needs to contain the following information:

- An explanation of why the change is necessary.
- Identification of both the deleted work and the added work.
- Revised subtotals for all COA DBE firms. The change order only needs to address each affected DBE firm, not all COA DBE firms.
- Revised total attainment for DBE participation.
- Documentation of a good faith effort to substitute should go in the change order file, (if required, see 1-2.7F(6)).

1-2.7F(9) Consulting with the Office of Equal Opportunity

The Department's DBE program is managed by the External Civil Rights Branch of the Office of Equal Opportunity (OEO) at Headquarters. The Project Engineer must communicate extensively and continuously with that office about any aspect of the DBE activities on the project. Any questions received from the Contractor or subcontractor about DBE provisions or enforcement should be answered only with full knowledge of the opinions and directions of the OEO. The OEO phone number at Headquarters is 360-705-7085.

The Office of Equal Opportunity is also required to approve DBE firms that are manufacturers and regular dealers.

The State Construction Office must execute any change orders that revise the COA commitment. When preparing the change order in CCIS pending CO's menu use option 3, "Condition of Award Items." Include the first three items listed above in the change order document. When submitting the change order to the Contractor for signature, the Project Engineer should also send copies to the affected DBE firms and should advise the Contractor that this has been done.

1-2.7G On-the-Job Training (OJT)

1-2.7G(1) On-the-Job Training Special Provisions — General

The requirements for training are made a part of the contract by the special provision, Special Training Provisions. The amount of training is set by the WSDOT Office of Equal Opportunity based on the opportunities presented by the work and the needs in the geographical area involved. The requirements for trainee, training plan approval, and trainee payment are all specified in the contract special provisions.

1-2.7G(2) OJT Required Reports

The contract provisions allow the Contractor to accomplish training as part of their work activities, or through the activities of their subcontractors or lower-tier subcontractors. However the prime contractor is designated as being solely responsible for the completion of the training requirements as they are outlined in the contract provisions.

- Form DOT 272-049 Training Program — A training program is to be completed by the Contractor. The program must be submitted to the Engineer for approval prior to commencing contract work. The Project Engineer's office may approve Bureau of Apprenticeship Training (BAT) or the State Apprenticeship Training Committee (SATC) programs provided they meet the requirements specified in the contract provisions. The Region will review any non-BAT/SATC training plans submitted under section III of the form for compliance. If the plan appears to be in compliance, the Region will sign it, check "Approval Recommended", and submit it to the WSDOT Office of Equal Opportunity (OEO) for concurrence. If concurrence is granted, OEO will note this on the plan and will submit the plan to FHWA for approval.
- Form 272-050 Apprentice/Trainee Approval Request — Approval of an individual trainee cannot be authorized until an approved Training Program is filed with the Region. This form is to be submitted by the Contractor for each trainee to be trained on the project. When a BAT/SATC apprentice/trainee is first enrolled, a copy of the apprentice/trainee's certificate showing apprenticeship/training registration must accompany the Trainee Approval Request. Trainees are approved by the Project Engineer's office based on the criteria in the special provisions.
- Form 226-012 EF Trainee Interview Questionnaire — One trainee interview is to be conducted for each craft designated on an approved training program for contracts which have 600 or more training hours or on projects otherwise designated by the Region EEO. The Region EEO shall designate additional contracts on which trainee interviews are to be completed in conjunction with those that meet the criteria above to insure that trainee interviews are conducted on at least one fourth of all the contracts that have training hours established for any given construction season. The intent of these training interviews is to document that the trainees are working and receiving proper training consistent with their approved programs. DOT form 226-012EF should be used to document these spot checks.
- Form DOT 272-060 Federal-aid Highway Construction Annual Training Report — This report is to be completed annually by the Project Engineer summarizing the training accomplished by the individual trainees during the reporting period beginning January 1 and ending December 31 of the calendar year. This report is due at the Regional EEO Office by December 20th of the same calendar year as the reporting period. The "gap" between the reporting deadline (December 20) and the end of the reporting period (December 31) is not significant enough to adversely affect the data, and should not be a source of concern for the project staff.

1-2.7G(3) Payment for "Training"

At progress estimate cutoff time, the Contractor shall submit a certified invoice requesting payment for training. The invoice must provide the following information for each trainee:

- The related weekly payroll number
- Name of trainee
- Total hours trained under the program
- Previously paid hours under the contract
- Hours due for current estimate
- Dollar amount due for current updated estimate

Retroactive payment may be allowed provided:

- The Training Program is approved
- There are no outstanding issues or circumstances that would have prevented approval of the apprentice/trainee

Increases in training hours are allowable and may be approved on a case by case basis by the Project Engineer in consultation with the Regional EEO Officer.

1-2.7H Apprentice Participation

1-2.7H(1) Apprentice Participation Special Provision – General

The requirements for apprentice utilization are made a part of the contract by the special provision "Apprentice Utilization". The use of this provision, and the percentage of required apprentice participation, will be determined by meeting the date and dollar thresholds as follows:

- 10% On contracts advertised on or after July 1, 2007 but before July 1, 2008 and estimated to cost five million dollars or greater.
- 12% On contracts advertised on or after July 1, 2008 but before July 1, 2009 and estimated to cost three million dollars or greater.
- 15% On contracts advertised on or after July 1, 2009 and estimated to cost two million dollars or greater.

Only apprentices enrolled in and apprenticeship program approved by the Washington State Apprenticeship Council may be counted toward attainment of the apprentice utilization requirement. The Contractor may attain the apprentice utilization goal as part of their work activities, or through the work activities of subcontractors or lower-tier subcontractors. Attainment of the requirement will be calculated by comparing the total labor hours worked by all the enrolled apprentices performing work for the Contractor and any subcontractors, in all trades, with the total labor hours performed on the project, in all trades.

It is important to note that the Apprentice Utilization Requirement is a separate program from the Federal Training requirements included in all contracts which contain federal monies. The two programs are not mutually exclusive. The intent of the federal program is to increase the availability of women and minorities within the construction trades; where

as the Apprentice Utilization Requirement (state program) is promoting the use of apprentices in general. The state program will generally be much larger than the federal training program. Federal training goals are set on approximately 25% of all federally funded contracts and the state program will be required on all contracts estimated to cost two million dollars or greater. The state program will ultimately require that 15% of all labor hours on a project be performed by enrolled apprentices; this could range from 700 to 10,000 hours. Training hours on federal contracts range as high as 3,000 hours for a similar sized contract.

1-2.7H(2) Apprentice Utilization Plan

The Contractor is required to submit an apprentice utilization plan, on WSDOT Form No. 422-115 EF, to the Project Engineer within 30 days of execution of the contract. This plan is not submitted for approval; but to inform the Project Office as to how the Contractor will attain the utilization goal. The intent of the plan is to provide the Project Engineer with enough information to track the Contractor's progress in the utilization requirements. If the plan does not indicate that the Contractor will attain the goal, a revised plan should be requested and/or the Contractor should be notified that "Good Faith" documentation will be required, as specified.

1-2.7H(3) Reporting

For each contract with an apprentice utilization requirement, the Contractor is required to submit a monthly *Statement of Apprentice/Journey Participation* (WSDOT Form No. 422-110 EF) to the Project Office. This report shall be a consolidated report, and include data from the Contractor's work activities, as well as from the work activities of all subcontractors. This report will include the total hours and number of apprentices and journeymen working on the contract during the reporting period. The report will list the apprentices by name, registration number, and craft or trade; as well as the name of the Contractor or subcontractor for whom the apprentice is working. The reporting period starts on the first day of the month and runs through the last day of the month, and will be reported on last working day of the following month. The Project Office should use this report to measure the Contractor's progress toward attainment of the utilization goal. If apprentices are not being reported on the project when the plan shows that they should be working, the Project Office should contact the Contractor and request a revised plan. The Project Office should forward all apprentice utilization plans, reports, and any "Good Faith" documentation submitted, to the Headquarters Construction Office, through the Region Documentation Engineer.

1-2.7H(4) "Good Faith" Procedures

"Good Faith" is the action taken by the Contractor to meet the Apprentice Utilization requirement. Documentation of the Contractor's "Good Faith" efforts is only required if the Contractor fails to attain the goal. "Good Faith" documentation may arrive with the monthly report or at the completion of the contract. The need to provide "Good Faith" documentation should be stressed if it is determined that the monthly reports show a level of attainment that significantly differs from that in the Apprentice Utilization Plan. If this should occur, the Project Office should request

a revised Apprentice Utilization Plan and/or “Good Faith” documentation from the Contractor. “Good Faith” documentation is basically written correspondence form approved program sponsors indicating that apprentices are not available to the Contractor. All apprentice programs must be approved by the Washington State Apprenticeship Council. A listing of approved programs can be found at the Department of Labor and Industries web page.

1-2.8 Control of Work

1-2.8A Authority of the Project Engineer

The Project Engineer is given considerable authority to enforce the provisions of the contract under Section 1-05.1 of the *Standard Specifications*. This authority is tempered by WSDOT’s policies and delegation of authority from the Engineer to the Project Engineer. Accordingly, considerable care and professional judgment must be exercised by the Project Engineer in order to avoid exceeding the authority as delegated and to avoid decisions or actions that may be contrary to WSDOT policy. Should there be any doubts as to the limits of authority, the Project Engineer should consult the Regional Construction Manager.

Standard Specifications Section 1-07.16(1) *Private/Public Property* restricts the contractor from using Contracting Agency owned or controlled property other than property directly affected by the contract work without the approval of the Engineer. The Engineer has the authority to allow the use of Contracting Agency owned or controlled property within the project limits and any other property specifically listed for use in the contract. The use of any other Contracting Agency owned or controlled property would require a lease agreement as detailed in Chapter 11 of the WSDOT *Right of Way Manual*, M26-01.

In many cases, the courts have held that where the Project Engineer has exceeded the authority provided in the plans and specifications or the authority delegated by the Engineer, the actions of the Project Engineer are binding upon WSDOT. Because of this, it is important that the Project Engineer make no instructions, verbally or by written memoranda, that are outside the scope of the plans, specifications, contract provisions, or the authority delegated by the Engineer.

In advance of or during the course of the project, in the interest of economy and efficiency, noncritical items of work may be identified for which the Project Engineer may choose to modify the normal inspection or testing procedures. In taking these actions, the Project Engineer is acting under the professional responsibility inherent in all actions as a representative of the Department and a Licensed Professional Engineer. Full accountability of such incidents is expected. The scope of such actions should not exceed \$10,000 for a single bid item, nor exceed \$25,000 for an entire project.

The nature of the work to be accepted in this manner will generally be limited to minor and isolated items. Acceptance would typically involve dimensional conformance to the plans and a visual determination that the materials are suitable, however, the Project Engineer may require some testing or other means to support a decision. In such action, the Project Engineer should be guided by the

principle of achieving the intent of the contract, attaining reasonable expectations of service life proportional to cost, and protection of public safety. Typically, changes in acceptance procedures will only be made to work outside of vertical lines through the horizontal limits of the traveled way. Consideration should be given to the consequences of subsequent failure, ease of replacement, whether or not there is a high variability in the quality of similar work, or any other pertinent facts. Actions taken in accepting such materials should be identified in the project records with acknowledgment by signature of the Project Engineer. Materials accepted in accordance with this guidance should be identified in the Project Engineer’s preparation of the Certification of Materials under Chapter 9-1.5 of this manual.

The use of this process is not intended to retroactively justify deficiencies discovered after the completion of work.

1-2.8B Contractor’s Equipment, Personnel, and Operations

The Contractor is required to furnish adequate equipment for the intended use. The Contractor’s equipment must also be maintained in good working condition. Prior to the start of work, the Project Engineer should ensure, by inspection, that the Contractor’s plant, equipment, and tools comply with the specifications.

Whenever the specifications contain specific equipment requirements, the Project Engineer should verify that the equipment provided meets these specifications. This should be documented in project records such as the Inspector’s Daily Report. The Contractor is required to furnish, upon request, any manuals, data, or specialized tools necessary to check the equipment.

It is most important that the operation of automatically controlled equipment be checked carefully and that the Contractor be advised immediately whenever the equipment is not performing properly.

The Contractor’s supervisory personnel must be experienced, and able to properly execute the work at hand. If, in the Project Engineer’s opinion, the Contractor’s supervisory personnel are not fully competent, the Project Engineer should immediately notify the Regional Construction Manager of the facts in the matter, seeking assistance and advice.

It is expected that, consistent with WSDOT’s policies and delegated authority, the Project Engineer will assist the Contractor in every way possible to accomplish the work under the contract. However, the Project Engineer must not undertake, in any way, to direct the method or manner of performing the work. Contrary to popular legend, this statement is true of force account work as well. Should the Contractor select a method of operation that results in substandard quality of work, non-specification results, a rate of progress insufficient to meet the contract schedule, or that otherwise violates the contract specifications or provisions, the Contractor should be ordered to discontinue that method or make changes in order to comply with the contract requirements. Where cooperation cannot be achieved, the Project Engineer should notify the Regional Construction Manager of the facts in the matter, seeking assistance and advice.

1-2.8C Defective or Unauthorized Materials or Work

Contract Final Acceptance for all work completed on a project is made solely by the Secretary of Transportation acting through the State Construction Engineer. However, the Engineer relies heavily on the actions and professional opinions of others, involved throughout the course of work, in determining acceptability. Because of this, it is expected that the Project Engineer, working with the assistance of the Regional Construction Manager, as well as making full use of the many resources available at both the Regional level and Headquarters, particularly the office of the State Construction Engineer, will ensure that sufficient inspection is conducted in order to determine that the work performed or the materials utilized to construct the project comply with the requirements included in the contract plans and specifications. When inspections or tests are performed that indicate substandard work or materials, the Project Engineer should immediately notify the Contractor, rejecting the unsatisfactory work or material. When a review of the Contractor's work or materials used indicate questionable acceptability with regard to the specifications, the Contractor should be notified as quickly as possible so that changes in materials or work methods can be made in order to avoid materials or work being rejected.

1-2.8C(1) Defective Materials

The contract plans and specifications for construction of a project require that specific materials and/or work practices be utilized in completing the work. The Project Engineer may reject any materials not conforming to the requirements of the specifications. The rejected materials, whether in place or not, are to be immediately removed from the site of the work unless the following guidelines for acceptance of non-specification materials are followed:

Material Not in Place

1. Nonconforming aggregate materials that are within the defined tolerance limits noted in Chapter 9-5.6 of this manual may be accepted for use on the project in accordance with the guidance in Chapter 9-5.4(B).
2. There may be situations where WSDOT could obtain significant benefit from the use of nonconforming aggregate materials. This requires prior concurrence of the State Construction Engineer and a change order modifying the project specifications.

Except for 1 and 2 above, materials that are known in advance as failing to comply with the Specifications are not to be incorporated into the work.

Material in Place

1. Price adjustments have been developed and are referenced in the contract for acceptance of certain materials whose properties cannot be determined until they are in place. Items this policy applies to include: concrete compressive strength, Portland cement concrete pavement thickness, asphalt concrete gradation, oil content, density, and pavement smoothness.

2. Material incorporated into the work that is subsequently found to be in nonconformance with the specifications and for which price adjustments for acceptance are not included in the contract, must be reviewed to determine acceptability. The determination of acceptability should be made only when, in the Project Engineer's judgment, there is a possible service or benefit to be obtained from its use. If it is determined that no benefit or service is obtained from the material's use, the Project Engineer may direct that the material be immediately removed and replaced at no cost to WSDOT.

The Project Engineer may consult the State Materials Laboratory, the State Bridge and Structures Office, or other design organizations for assistance in determining the usefulness of the nonconforming material. If consulted, these offices will offer technical advice to the extent that information is available. It is not intended to enter into extensive research to assess material which could be removed and replaced under the contract terms.

If the material is to be accepted for continued use, a determination of possible reduced service and the resulting credit to be assessed by change order, should be completed by the Project Engineer. This determination must meet with the Region Construction Manager's approval for execution of the change order. In addition, prior review and concurrence must be obtained from the State Construction Engineer for the intended application of the material and the Materials Engineer for concurrence with issues of material performance. With this determination for acceptance of non-specification material, discussions should be initiated with the Contractor and a final change order completed.

If it is determined that the specification violation will not compromise the performance of the material and the nature of the violation is considered to be more of a technical infraction of the specification, the material may be accepted with a change order, possibly including a price reduction. If there is sufficient data and if the nature of the material makes analysis feasible, the State Materials Laboratory will determine a pay factor using QC/QA methods similar to those described in the *Standard Specifications*, Section 1-06.2(2). If QC/QA can not be applied, the Project Engineer may determine an adjustment subjectively, using whatever information is available. This assessment or price adjustment may vary from a portion of the material costs up to the total contract unit bid price for the bid item involved. If it is determined that the violation is serious enough that the material can not be accepted for use on the project, the Project Engineer may direct its complete removal and replacement at no cost to WSDOT.

All change orders for acceptance of nonconforming materials are Contractor proposed and WSDOT is under no obligation to accept or approve any of them.

1-2.8C(2) Defective or Unauthorized Work

The following types of activities will be considered unauthorized work and will be completed solely at the risk and expense of the Contractor:

- Work performed contrary to, or regardless of, the instructions of the Project Engineer.

- Work and materials that do not conform to the contract requirements.
- Work done beyond the lines and grades set by the plans or the Engineer.
- Any deviation made from the plans and specifications without written authority of the Project Engineer.

Until all issues of material acceptance and conformity to the contract plans and specifications can be resolved, unauthorized work will not be measured and paid for by WSDOT. The Project Engineer may direct that all unauthorized or defective work be immediately remedied, removed, replaced, or disposed of. In correcting unauthorized or defective work, the Contractor will be responsible to bear all costs in order to comply with the Engineer's order.

For additional guidance, see Section 1-05.7 of the *Standard Specifications*. If the Contractor fails or refuses to carry out the orders of the Engineer or to perform work in accordance with the contract requirements, the Project Engineer should immediately notify the Regional Construction Manager of the facts in the matter, seeking assistance and advice.

1-2.8C(3) Material Acceptance by Manufacturer's Certificate

All material is to be accepted for use on the project based on satisfactory test results that demonstrate compliance with the contract plans and specifications. All work demonstrating compliance is to be completed prior to the material's incorporation into the work. In many cases, this testing has already been completed in advance by the manufacturer. A Manufacturer's Certificate of Compliance is a means to utilize this work in lieu of job testing performed prior to each use of the product. While this provides for a timely use of the material upon arrival to the job site without having delay in waiting for the return of test results, it creates potential difficulties in obtaining and assessing the adequacy of a certificate.

Section 1-06.3 of the *Standard Specifications* describes the procedures for acceptance of materials based upon the Manufacturer's Certificate of Compliance. Division 9 of the *Standard Specifications* describes those materials that may be accepted on the basis of these certificates. Since a certificate is a substitute for prior testing, it is intended that all certificates be furnished to the Project Engineer prior to use or installation of the material.

However, there are some circumstances where the Contractor may request, in writing, the Project Engineer's approval to install materials prior to receipt and submittal of the required certificate. The Project Engineer's approval of this request must be conditioned upon withholding payment for the entire item of work until an acceptable Manufacturer's Certificate of Compliance is received. Examples of materials that *shall not* be approved by the Project Engineer for installation prior to the Contractor's submittal of an acceptable certificate are: materials encased in concrete (i.e., rebar, bridge drains, etc.); materials under succeeding items where the later work cannot be reasonably removed (i.e., culvert under a ramp to be opened to traffic); etc. The Project Engineer's approval or denial shall be in writing to the Contractor, stating the circumstances that determined the decision. If the

requirements of this provision are followed, including the written request by the Contractor and the written approval by the Project Engineer, then the remedy for failure to provide the Certificate is the withholding of 100% of the cost of the material and the cost of the work associated with the installation of the material.

At the conclusion of the contract, there may still be some items that are lacking the required certificates. These items must be assessed as to their usefulness for the installation, prior to payment of the Final Estimate and subsequent Materials Certification of the contract. The review of these items may include:

- Comparison with the suitability of other shipments to the project or other current projects.
- If possible, sampling and testing of the items involved or residual material from the particular lot or shipment.
- Independent inspection on site of the completed installation.

If it is determined that the uncertified material is not usable or is inappropriate for the completed work that incorporates the material, the Contractor should be directed to immediately remove the material, replacing it with other certified materials. If the material is found to be usable and is not detrimental to the installation it was incorporated into, it may be left in place but, if the provisions of Section 1-06.3 were followed, with a reduction to no pay. The reduction in pay will be the entire cost of the work (i.e., unit contract price, portion of lump sum, etc.) rather than only the material cost. The Contractor should continue to have the option of removing and replacing the uncertified material in order to regain contract payment for the installation. If the provisions of Section 1-06.3 were not followed, then there can be no withholding beyond the value of the missing work itself (the preparation and submittal of the Certificate.)

1-2.8D Contractor Submittals

Missing submittals is a principal source of delays in closing out the project and processing the final estimate. As the project proceeds toward completion, the Project Engineer and the Contractor should attempt to obtain all submittals as the need arises. These might include such things as materials certificates, certified payrolls, extension of time requests, or any other item or document that might delay processing the final estimate. Attention is needed to assure the receipt of these items from subcontractors as they complete their work.

1-2.8E Guarantees/Warranties

As specified in Section 1-05.10 and 1-06.5 of the *Standard Specifications*, the Contractor shall provide to the Project Engineer all guarantees, warranties, or manuals furnished as a customary trade practice, for material or equipment incorporated into the project. The Project Engineer should transmit the originals of any such guarantees / warranties or manuals to the organization that will be maintaining the items covered by the guarantee/warranty or manuals. The Project office should maintain a copy of the guarantee/warranty, and a letter of transmittal for manuals, with the materials documentation file for the project.

1-2.8F Contractor's Performance Reports

The procedures for completing and submitting the Prime Contractor's Performance Report are included with the report, Form 421-010, and the *Prime Contractor's Performance Report Manual*, M 41-40. The requirement for this report and other direction can also be found in WAC 468-16-150 and WAC 468-16-160.

Should the Contractor's typical performance on a contract become below standard, the Project Engineer should immediately notify the Regional Construction Manager of the facts in the matter, seeking assistance and advice.

1-3 Estimates and Records

1-3.1 Estimates

1-3.1A General

Payment for work performed by the Contractor and for materials on hand must be made in accordance with Section 1-09 of the *Standard Specifications*. To facilitate payments to the Contractor and ensure proper documentation, WSDOT utilizes an automated computer system to record project progress in terms of bid item quantity accomplishment. This is then used to pay the Contractor for actual work performed during each designated pay period or for materials on hand. The automated system that completes this task is called the Contract Administration and Payment System (CAPS). CAPS utilizes an electronic tie between each project office's computer system and the mainframe computer. This system provides access to a large volume of corporate data and facilitates the maintenance of this data by different groups in different locations. Some of these different activities include:

- Contract Initiation — A Headquarters action whereby new contracts are created and stored in a computer file. The information consists of the names of the Contractor and the Project Engineer, project descriptive data, accounting identifier numbers, preliminary estimate, proposal date, bid opening date, award date, execution date, accounting groups and distributions, and an electronic ledger.
- Project Ledger — An updating process by the Project Office which keeps track of work performed on the contract as it is completed.
- Estimate Payments — A Project Office action whereby progress estimates and Regional final estimates are processed directly from the Project Office. The Headquarters Final Estimate process activates the Region Final when all the required paperwork is in place. Supplemental final estimates are processed by Headquarters only. Complete instructions for use of the CAPS computer system are included in the manual titled *Contract Administration and Payment System* (M 13-01).

1-3.1B Progress Estimates

Progress estimates are normally processed on the 5th of the month for odd numbered contracts and on the 20th of the month for even numbered contracts. Where the Project Engineer deems it appropriate, estimates may also be run on other dates.

Estimates may also be run on other dates if the progress estimate or parts of the progress estimate were withheld to encourage compliance with some provision of the contract and the Contractor resolves the issue that caused the withholding. These estimates should be paid immediately upon resolution by the Contractor.

Within the CAPS system, the basis for making any estimate payment is information from the project ledger. Every entry in the ledger is marked by the computer as either paid, deferred, or eligible for payment. Before an estimate can be paid, a Ledger Pre-Estimate Report (RAKD300C-PE) must be produced. In constructing this report, the CAPS system gathers all the ledger entries that are identified as eligible for payment, prints them on the report summarized by item, and shows the total amount completed to date for that item but not yet paid for by progress estimate. The report also shows any deferred entries or exceptions if they exist and includes a signature block for the Project Engineer's approval.

If there are errors or omissions in this report, the ledger must be changed to reflect the correct data. After corrections are made, the Ledger Pre-Estimate Report must be run again in order to get the corrections into the report and made available for payment by progress estimate. Once the Ledger Pre-Estimate Report is correct, an actual estimate can be paid. The report containing the Project Engineer's signature should be retained in the project files.

The estimate process is then accomplished with a few keystrokes in option 2, estimate payments, in the CAPS main menu. At this point, the CAPS system will automatically calculate mobilization, retainage, and the sales tax. The warrant will be produced, signed, and sent to the Contractor along with the Contract Estimate Payment Advice Report and two different sales tax summary reports. Copies of these reports will also be sent to the Project Office. When the Project Office receives their copy of the Contract Estimate Payment Advice Report, the total amount paid for contract items should be checked against the Pre-Estimate Report. This helps to verify that the amount paid was what the Project Engineer intended to pay. In addition, the ledger records that produced the estimate will now be marked by the CAPS system as being paid.

Up to the point of actually producing the warrant, the entire process for making a progress estimate payment is initiated and controlled by the Project Office.

Particular attention should be given to the comparison of the plan quantities and the estimate quantities for the various groups on the project as shown on the Ledger Pre-Estimate Report. Overpayments on intermediate progress estimates are sometimes difficult to resolve with the Contractor at the conclusion of the project.

New groups which do not change the termini of the original contract or changes in groups should be accomplished by memorandum from the Region to the State Accounting Services Office.

An additional estimate may be prepared if considerable work has been done between the date of the last progress estimate and the date of physical completion when the Engineer anticipates delays in preparing the final estimate. Should this circumstance occur, the additional estimate should show the work done to date no later than the day before the date of physical completion.

1-3.1B(1) Payment for Material on Hand

Payment for material on hand (MOH) may be considered for materials intended to be incorporated into the permanent work. The requirements for payment of MOH are noted in Section 1-09.8 of the *Standard Specifications*. Payments for MOH are made under the 900 series of item numbers as ledger entries and need to be backed out as items are utilized such that 900 series entries are zeroed at close out of the contract. Therefore logically payment for MOH shall not exceed the value of the corresponding bid item. It is the responsibility of the project engineer to devise procedures that assure this is done correctly.

Payments may be made provided the contractor submits documentation verifying the amounts requested, the materials meet the requirements of the contract and the materials are delivered to a specified storage site or stored at the suppliers/fabricators as approved by the project engineer. Materials shall be segregated, identified and reserved for use on a specific contract or project. Payments commensurate with the percentage of completion may be paid for partially fabricated items.

All materials paid for as MOH must be readily available for inspection by the owner. Steel materials must be available for inspection but this availability need not be immediate. Reasonable notice should be given to allow the contractor to locate and make the material available for inspection. The project engineer may accept a higher level of risk that steel material may not be reserved for our use. The contractor's obligation to perform the work and the surety's guarantee of this obligation serve to offset the risk that reserved materials are diverted to other projects.

When materials paid for as MOH are stored in areas outside the general area the region shall make arrangements for inspection as deemed necessary prior to making payment. The region may utilize other regions or the State Materials Laboratory in doing so.

When contracts are estimated to cost more than \$2 million and require more than 120 working days to complete, a General Special Provision (GSP) will be included in the contract provisions, requiring documentation from the contractor as the basis for MOH payments and deductions. When this GSP is included in the contract provisions, the following procedure is used to determine how much of the MOH payment should be deducted from an estimate:

- Each month, no later than the estimate due date, the contractor will submit a document and the necessary backup to the Project Engineer that clearly states:
 - The dollar amount previously paid for MOH,
 - The dollar amount of the previously paid MOH incorporated into the various work items during the month, and
 - The dollar amount that should continue to be retained in MOH items.

If work is performed on the items and the contractor does not submit a document, all previous associated MOH payments may be deducted on the next progress estimate.

1-3.1B(2) Payment for Falsework

On those projects which include a lump sum item for bridge superstructure, payment may be made on request by the Contractor for falsework as a prorated percentage of the lump sum item as the work is accomplished. The Project Engineer may require the Contractor to furnish a breakdown of the costs to substantiate falsework costs. For any given payment request, the Contractor may be required to furnish invoices for materials used and substantiation for equipment and labor costs.

1-3.1B(3) Payment for Shoring or Extra Excavation

When Shoring or Extra Excavation Class A is included as a bid item, payment must be made as the work under the bid item is accomplished, the same as for any other lump sum bid item. When Shoring or Extra Excavation Class B is included as a bid item, measurement and payment shall be made in accordance with Sections 2-09.4 and 2-09.5 of the *Standard Specifications*. RCW 39.04 provides that the costs of trench safety systems shall not be considered as incidental to any other contract item, and any attempt to include the trench safety systems as an incidental cost is prohibited. Accordingly, when no bid item is provided for either Shoring or Extra Excavation Class A or Shoring or Extra Excavation Class B and the Engineer deems that work to be necessary, payment will be made in accordance with Section 1-04.4 of the *Standard Specifications*.

1-3.1B(4) Payment for Asphalt and Fuel Cost Adjustment

Selected projects may include the specifications for Asphalt Cost Adjustment or Fuel Cost Adjustment (or both) as a General Special Provision. Not all projects will contain these provisions, since their use depends on the type of work, the duration of the contract, and Region preference. For those contracts containing either of the cost adjustment bid items, an adjustment (payment or credit) will be calculated monthly for qualifying changes in the index price of the commodity. No adjustment (payment or credit) shall be made if the 'Monthly Cost' is within 10 percent of the 'Base Cost', and only those items that are included in the provision are eligible for adjustment.

It is important to understand that the adjustments provided by these provisions are not a guarantee of full compensation for changes in the contractor's cost, and that they are intended only to absorb some of the risk of severe cost escalation during contract performance. Because of this, the method of computing the adjustment has been simplified to eliminate tedious considerations that would otherwise be required to provide precise reimbursement of actual costs.

The provisions for this item are prescriptive, and should result in the correct adjustment if they are followed to the letter. Regardless of whether the estimate cutoff is the 5th of the month or the 20th of the month, any adjustment will apply the most current monthly index value to the current quantity paid in the current estimate. This applies to payments that are deferred from one estimate to a later estimate as well.

The provisions for both cost adjustments are silent in regard to changed work because there are other contract clauses that address how the Department will pay for changed work. Should changes occur in bid items that are eligible for adjustment, equitable adjustments should adhere to the guidance provided in Section 1-2.4C of this Manual. Under no circumstances should eligible items that were not included in the specifications at the time of bid be added by change order after award and execution of the contract. Likewise, these provisions should not be added by change order and applied to work that was performed prior to the change order agreement. FHWA will not participate in the cost of these retroactive price adjustments.

1-3.1B(5) Payment for Surplus Processed Material

When excess aggregate is produced by the Contractor from a WSDOT furnished source, the Contractor will be reimbursed actual production costs if the excess materials meet the requirements of Section 1-09.10 of the *Standard Specifications*. If more than one type of aggregate is involved, the provisions of Section 1-09.10 apply to each type.

If WSDOT has a need for the excess aggregate for either maintenance or future construction contracts, the material may be purchased into the appropriate inventory account. The Project Engineer should contact Region Maintenance and Accounting for guidance. If aggregates are to be disposed of as surplus, the Project Engineer should contact the State Administrative Services Office, Purchasing and Inventory Section, for additional assistance.

1-3.1B(6) Liquidated Damages

Liquidated Damages and Direct Engineering, or other related charges, are to be addressed as described in the contract specifications, Section 1-08.9 of the *Standard Specifications*, and Chapter 1-2.5G of this manual. Direct Engineering charges are a form of Liquidated Damages and must be listed on the monthly progress estimates on the line for Liquidated Damages. Traffic related damages as described in Chapter 1-2.5G(2) of this manual are to be listed under Miscellaneous Deductions. The Project Engineer must evaluate potential Liquidated Damages that have accrued as a result of the expiration of contract time before the damages are withheld from moneys due the Contractor. The work and circumstances that have occurred over the course of the project should be reviewed to determine if there is potential

entitlement for granting additional contract time. Liquidated Damages that have accrued should be adjusted for this evaluation. Liquidated Damages deemed chargeable should then be withheld from moneys due the Contractor each monthly progress estimate as Liquidated Damages accrue. While the Project Engineer takes the action to withhold damages as the work progresses, only the State Construction Office may actually assess those damages.

1-3.1B(Z) Credits

Dollar amounts may be deducted as a "Below the Line Miscellaneous Deduction" from progress or final estimates when WSDOT is due a credit from the Contractor. Routine credits from the Contractor to WSDOT include, but are not limited to, the following items:

- Engineering labor costs when due to Contractor error or negligence, additional engineering time is required to correct a problem. This includes the costs of any necessary replacement of stakes and marks which are carelessly or willfully destroyed or damaged by the Contractor's operation.
- Lost and/or damaged construction signs furnished to the Contractor by WSDOT. The Contractor should be given the opportunity to return the signs or replace them in kind prior to making the deductions.
- Assessment to WSDOT from a third party that is the result of the Contractor's operations causing damage to a third party, for example, damage to a city fire plug. Actual costs will be deducted from the estimate.
- Other work by WSDOT forces or WSDOT materials when the Contractor cannot or will not repair damages that are the responsibility of the Contractor under the contract.
- Liquidated damages not associated with contract time, i.e., ramp closures, lane closures (see Chapter 1-2.5G).
- As provided for in the specifications, specific costs or credits owed WSDOT for unsuccessful contractor challenged samples and testing.

The authority to withhold and assess routine "Below the Line Miscellaneous Deduction" on progress and final estimates has been delegated to the Regional Construction Manager, and may be further subdelegated to the Project Engineer. The Project Engineer must give written documentation to the Contractor describing the deduction and provide sufficient notice of the impending assessment.

Credit items which are specifically provided for by the *Standard Specifications* or contract provisions, such as non-specification density, non-specification materials, etc. may be taken through the contract items established for those purposes. A change order is required for credit items which are not specifically provided for by the contract provisions.

Occasionally a Contractor will send a check directly to a Project Office for payment of money due WSDOT. (The Project Office should not request payment.) Whenever a Project Office or WSDOT employee receives a check or cash directly from a Contractor, it is very important that the guidance found in Directive 13-80, Control of Cash Receipts, be followed.

1-3.1B(8) Railroad Flagging

All dollar amounts actually incurred by the Railroad Company for railroad flagging, under the terms of the typical railroad agreement, will be paid by WSDOT. The Contractor will incur no costs for railroad flagging unless the flagging is for the Contractor's benefit and convenience. In this case, the Project Engineer will deduct this cost on monthly progress estimates as a below the line item in the Contract Administration and Payment System.

1-3.1B(9) Payment for Third Party Damages

Section 1-2.4I of this manual details when WSDOT assumes responsibility and pays for third party damages. The *Risk Management Manual, M 72 01*, provides detailed guidance on procedures, including lines of communication. Payment should be made under the item "Reimbursement for Third Party Damages". This item is only intended to be used for costs that are the responsibility of the contracting agency. If this item was not included in the contract, it may be added by change order using a separate group for each Control Section in which an incident occurs. On some items such as "Repair Impact Attenuator" there has been a conscious decision by the contracting agency during design to assume a risk which is otherwise the contractor's. It would not be appropriate to assume this risk for other items of work by adding a similar pay item through a change order.

The next step is for the Project Engineer to determine if an incident warrants an attempt to recover costs based on cost effectiveness. If so, a memo is necessary to provide notice and information to the risk management office. Basically, they need the information necessary to investigate the incident, find the responsible party, determine the amount of the damages and obtain reimbursement for the State. The risk management office needs the following information:

- Contract Number, Project Description
- Names of Witnesses
- Documentation Related to the Damage
 - Change Order Number
 - Field Notes
 - Police Reports
 - Work Order Coding
- Summary of Repair Costs

1-3.1B(10) Withholding of Payments

Withholding payments for work the Contractor has performed and completed in accordance with the contract should not be done casually. There must be clear contract language supporting the action. The authority to withhold progress payments is subdelegated to the Regions. Further delegation to the Project Engineers is at the discretion of each Region.

There are very few occasions when it would be appropriate to withhold the total amount of a payment for completed work. If a minor amount of cleanup remains, if a portion of

the associated paperwork has not been submitted, or if minor corrective measures are needed, then the correct action is to pay for the work and defer an amount commensurate with the needed remaining effort.

The concept of "allowing the Contractor to proceed at his own risk" and then withholding payment is not often supported by the contract. There is a contractual obligation to finish the work correctly, there would certainly be a "moral obligation" on the part of the Contractor to live up to the bargain, but there is no contract language that allows such an action. Specific exceptions to this rule are listed below.

Once a decision to withhold any part of the monthly payment has been reached, then it is imperative that the Contractor receive fair notice of this action. The method of this notice can be negotiated with the Contractor and could be a listing at the time of estimate cutoff, a copy of the pre-estimate report or other mechanism. Once notice has been provided, then it is also necessary to allow a reasonable time for corrections to be made.

No Payment for the Work

Standard Specification 1-06.3, "Manufacturer's Certificate of Compliance" is unique in that this is a situation, specified as part of the contract, where the contractor may request permission to assume the risk for no certificate and end up never being paid for the related work.

Progress Payment Deferral

In the following situations, the contract specifies that the contracting agency has the authority to defer the entire progress payment:

- The contracting agency may not make any payments for work performed by a Prime/Subcontractor until the contractor performing the work has submitted a Statement of Intent to Pay Prevailing Wages approved by Labor and Industries (RCW 39.12.040)
- Failure to submit the "required reports" by their due dates (*Standard Specification 1-07.11(10)B*)

Wage Administration in General

The administration of wages and payment for the work are separate issues. Holding a force account payment for certified payrolls is not appropriate. Withholding payments on the contract is suggested as a method to achieve compliance under the *Standard Specifications* pertaining to wages (1-07.9(1)). This remedy should not be used without approval of the Headquarters Construction Office. Routine enforcement of wage requirements should be done on their own merits utilizing the sanctions specified as follows:

State Wage Administration

Labor and Industries is the enforcement agency for state prevailing wage administration. The State (WSDOT) is protected under the contract from wage claims by reserving 5 percent of the moneys earned as retained percentage. This 5 percent is made available for unpaid or underpaid wages liens among other claims. Contract payments should not be deferred due to a contractor's failure to pay the State minimum prevailing wage.

Federal Wage Administration

FHWA 1273 specifies that the State Highway Administration (SHA) is in the enforcement role for federal prevailing wage administration. Under Section IV “*Payment of Predetermined Minimum Wage*” subsection 6., “*Withholding*,” the State Highway Administration (contracting agency) is authorized to withhold an amount deemed necessary to make up any shortfalls in meeting Davis Bacon prevailing wage requirements. It goes on to authorize the deferral of all payments, under certain conditions, until such violations have ceased. This is only for federal wage requirements and the amount “deemed necessary” must be based on the amount of the underpayment.

Application of the *Standard Specifications*

Under 1-05.1 Authority of the Engineer reads in part as follows: “If the Contractor fails to respond promptly to the requirements of the contract or orders from the Engineer:....
2. The Contracting Agency will not be obligated to pay the Contractor, and

Under Section 1-09.9 Payments reads in part as follows: “Failure to perform any of the obligations under the contract by the Contractor may be decreed by the Contracting Agency to be adequate reason for withholding any payments until compliance is achieved”.

Sounds good and we can do so, but withholding of payments owed the contractor must not be done on an arbitrary basis. Other than the previously noted exceptions, money is normally withheld because work/work methods are not in accordance with contract specifications. Also, the amount withheld must have a logical basis. We cannot penalize the contractor by withholding more than the out of compliance work is worth.

Withholding payments should not be used routinely as a tool for forcing compliance on general contract administration requirements. The State is protected against nonperformance by requiring a performance bond. In the event that lack of contract compliance puts the State at substantial risk monetarily or safety wise, it may be appropriate to inform the contractor of the compliance problem and suspend work under *Standard Specification 1-05.1 “Authority of the Engineer”* until corrections are made.

When withholding money, remember that delaying the contractor’s cash flow may damage the contractor’s ability to perform work. Before doing so, the State should be able to demonstrate:

- specifically what was not in accordance with the contract and where the requirement is specified in the documents
- that the amount withheld is commensurate with the amount of the unauthorized, uncompleted or defective work
- that the contractor was notified in a timely manner (within 8 days per prompt pay laws) and given a chance to make corrections
- that the State has worked with the contractor to mitigate corrections to non-specification work in order to minimize the cost

The State is required to pay the contractor in a prompt manner within 30 days after receipt of the work or after recognition of entitlement to additional compensation. The Project Engineer must keep an eye on the calendar when scheduling monthly estimate payments.

Regions are not authorized to withhold amounts that are greater than the estimated cost of the missing or incorrect portion of the work. Any such excess withholding must be approved by the Headquarters Construction Office.

1-3.1C Final Estimates — Regions

The final estimate for a project is processed in the same manner as a routine monthly progress estimate. The *Work Done to Date* entry on a final estimate is the physical completion date. When the Region final estimate is completed and is run in CAPS at the Region, it will not generate a warrant for the Contractor. Instead, the Region final estimate will produce several reports: a final Comparison of Quantities; the Contract Estimate Payment Advice; the Contract Estimate Payment Total; and the Sales Tax Summary.

These reports should be carefully checked to verify the accuracy of items, quantities posted, and the costs that have accumulated through various progress estimates during the life of the contract. Where necessary, corrections can be made to the ledger and the Region final estimate rerun as many times as it takes to make it correct before proceeding with the final estimate process.

If the final estimate shows an overpayment has been made to the Contractor, the estimate should still be processed in the same manner as a normal final estimate. If this occurs, the Contract Estimate Payment Totals report will show a minus amount due the Contractor. When the State Accounting Services Office receives the accepted final estimate package, that office will request any reimbursement due from the Contractor. The Project Engineer should not request reimbursement from the Contractor.

Once the Project Engineer has validated the final estimate amounts, a copy of the Comparison of Quantities Report, the Contract Estimate Payment Advice Report, and the Contract Estimate Payment Totals Report should be forwarded to the Contractor along with the Final Contract Voucher Certification. The Project Engineer might remind the Contractor that the person signing the Final Contract Voucher Certification must be authorized to do so. Authorized signatures are submitted by the contractor at the beginning of each contract.

Once the project has been physically completed, the final estimate package described above should be submitted to the Contractor for signature as soon as is reasonably possible. The final estimate package and request for the Contractor’s signature should be transmitted to the Contractor formally. The effort to prepare the final estimate package will vary in nature and magnitude, depending on the project. In some cases, this work will conflict with field work on other projects. It is expected that final estimate preparation will be scheduled and accomplished as soon as possible, but not later than six months after physical completion.

Once the signatures and all necessary documents have been obtained, the final estimate package should be assembled by the Region and submitted to the State Construction Office. If any needed recommendations for assessment of liquidated damages associated with contract time have not already been submitted, this submittal should include them. The State Construction Office must resolve all issues of liquidated damages before the final estimate can be accepted and submitted to the State Accounting Services Office.

1-3.1D Final Estimates — Headquarters

The final estimate package submitted to the State Construction Office consists of the following:

- Project Status Report — The Project Status Report should address contract time and recommendations for liquidated damages related to contract time, amount of railroad flagging used if any, Miscellaneous Deductions identified, etc. In addition, the report should indicate whether or not all Affidavits of Wages Paid have been received for the Contractor, and all subcontractors, agents or lower-tier subcontractors.
- Final Contract Voucher Certification — Form 134-146, original only.
- If an assessment of liquidated damages has been made previously, include a copy of the letter from the State Construction Engineer to the Contractor assessing these.
- If an assessment of miscellaneous damages or liquidated damages resulting from causes other than time, include copies of letters from the Region to the Contractor for assessment of these.
- Contract Estimate Payment Totals — RAKC300F-EA.

The final estimate package is reviewed by the State Construction Office and submitted to the State Construction Engineer for acceptance of the contract. The date on which the State Construction Engineer signs the Final Contract Voucher Certification becomes the final acceptance date for the contract itself. The final estimate package is then submitted to the State Accounting Services Office.

1-3.1D(1) Final Estimate Claim Reservations

Should the Contractor indicate a claim reservation on the Final Contract Voucher Certification, it must be accompanied by all of the requirements of Section 1-09.11(2) of the *Standard Specifications* (provided these have not been met in a previous claim submittal). The Project Engineer must assure that the requirements have been met prior to submitting the final estimate package to the State Construction Office. If the claim package is incomplete, return the voucher to the Contractor with notice of the missing parts.

1-3.1D(2) Unilateral Acceptance of Final Estimates

The Project Engineer cannot establish a completion date for the contract if the Contractor is unwilling or unable to submit one or more of the required documents noted in Section 1-08.5 of *Standard Specifications*. However, the Region can request that the State Construction Engineer accept the contract by signing the Final Contract Voucher Certification (FCVC) in spite of the missing documents.

If the Contractor has not signed the FCVC, the Region can request that the State Construction Engineer accept the contract without the Contractor's signature. The Region is responsible for notifying the Contractor before such a request is made. The State Construction Office will generate the certified letter notice mentioned in the *Standard Specifications*, Section 1-09.9. The date of the State Construction Engineer's signature of the FCVC becomes both the acceptance date and the completion date of the contract, both established unilaterally.

1-3.1E Supplemental Final Estimates

A Supplemental Final Estimate is a payment adjustment made to a contract after the Final Estimate has been processed and the project has been Accepted by the State Construction Engineer. A Supplemental Final Estimate may be necessary to correct an inadvertent over/under payment or where a claim settlement may require additional payment be made to the Contractor. In order to complete a Supplemental Final Estimate, the Project Engineer should complete and assemble the following items, routing them through the Region to the State Construction Office for review and further processing:

1. Assemble the backup information supporting the necessity and substantiating the cost of the changes to be made.
2. Complete any corrections or additional postings necessary in CAPS, including any postings to change order items added to CAPS for the settlement of a claim. (Please note, where additional CAPS postings are necessary after the Physical Completion date has been established, the "Work Done To" date in CAPS must be entered as the Physical Completion date or prior.)
3. Complete a Pre-Estimate report including the Project Engineer's signature recommending payment.
4. Complete a supplemental Final Contract Voucher Certification form reflecting the changes made and showing the new total "Final Amount".

While postings and corrections to CAPS may continue, once the Completion date has been established for a contract, CAPS will no longer allow the Project Engineer or the Region to process further payments to the Contractor. As a result, payment of the Supplemental Final Estimate will need to be completed for the Project Engineer by the State Accounting Services Office.

After review, the Pre-Estimate report will be signed by the State Construction Engineer authorizing payment to proceed. Once the supplemental payment is completed, the signed and executed Pre-Estimate report will be returned to the Project Engineer where it can be maintained as a part of the project payment files and made a part of the Region Temporary Final Records.

While a new Final Contract Voucher Certification is completed as a part of the Supplemental Final Estimate, the Acceptance date will remain the same as established by the State Construction Engineer's signature on the original Final Contract Voucher Certification.

1-3.1F Retained Percentage

Retained percentage withholding is based upon RCW 60.28, which provides that:

- A sum not to exceed 5 percent of the money earned by the Contractor on estimates be retained by the Contracting Agency.
- The Contractor may submit a bond for all or any portion of the amount of funds retained by WSDOT.

When a contract is awarded, the State Accounting Services Office or the Region Plans Office sends a package of contract documents to the Contractor.

This package of contract documents also includes the necessary instructions for the Contractor to make application for a bond to replace all or any portion of the retainage. The bond form will be processed by the State Accounting Services Office without involvement from Project Engineer's Office.

The Contractor, at any time during the life of the contract, may make a request to the Project Engineer for the release of all or any portion of the amount of funds retained. This request does not need consent of surety since the retainage bond form, for this purpose, requires their consent. The Region must forward this request by transmittal letter to the State Accounting Services Office. The Accounting Office will furnish the appropriate bond form to the Contractor for execution. The Contractor may return the executed bond form directly to the Accounting Office for final approval and signature by WSDOT.

- For projects that include landscaping, the Contractor may request that, 30 days after physical completion of all contract work other than landscaping work, WSDOT release and pay in full the amount of funds retained during the life of the contract for all work except landscaping.

In order to initiate this release of funds, Form 421-009 should be completed by the Contractor and submitted to the Project Engineer. In signing the request, the Project Engineer will confirm that all work, except landscaping work, is in fact physically completed. For any landscaping work that may have been completed, the Project Engineer will designate the amount of landscaping moneys, if any, that have been earned to date by the contractor. In the space designated for remarks the Project Engineer will identify the landscaping or plant establishment work that remains to be completed and its approximate value. Except for landscaping work, the Project Engineer will determine if all Statements of Intent and Affidavit of Wages Paid have been received for the work that has been physically completed. WSDOT will continue to withhold a 5 percent retainage of any moneys earned for landscaping work that may have been completed to date and will continue to retain 5 percent of the moneys that are to be earned for landscaping that is yet to be completed. A bond is not required.

The completed request along with the Project Engineer's cover memo confirming receipt of Statement of Intent and Affidavit of Wages Paid for the Contractor, subcontractor, and any lower-tier subcontractors who were involved in the completed work, is then forwarded to the State Construction Office for approval. Once approved, the Construction office will submit the request to the State Accounting Services Office for further processing. If no claims against the retainage for unpaid taxes, labor, or materials have been received within the designated 60 day period, the Accounting Office will release the designated retainage to the Contractor.

1-3.2 Final Records for Projects Constructed by Contract

The Project Engineer is responsible for preparing all necessary records in order to document the work performed on the contract. Detailed instructions on the records required and methods of preparing them are covered in Chapter 10 of this manual.

1-3.3 Disputes and Claims

1-3.3A Claims By the Contractor

1-3.3A(1) Disagreement, Dispute, Protest

During the course of a contract, differences of opinion may arise over decisions and plan interpretations that benefit one party at the expense of the other. It is the policy of WSDOT to pursue resolution of these differences at the earliest possible time and to fully recognize all of the contractual rights of the Contractor during the resolution process.

Disagreements, disputes and protests are the responsibility of the Project Engineer until a formal claim is filed in accordance with Section 1-09.11(2). Contact the Headquarters Construction Office for concurrence before taking any issue to a Disputes Review Board. The Project Engineer may employ a variety of techniques and procedures to pursue resolution of these issues. With the high potential for cost impact, it is strongly recommended that all disagreements be identified and tracked.

When a protest occurs during a contract, the Contractor shall pursue resolution through the Project Engineer as outlined in Section 1-04.5 of the *Standard Specifications*. The Specification contains specific requirements which, if not followed, may result in a waiver of the Contractor's claim. The Project Engineer should monitor whether the Contractor is meeting these requirements. If all of the requirements have been met, the Project Engineer shall evaluate the merits of the protest and take whatever appropriate action is needed to resolve the issue. If it appears that the Contractor has failed to meet any of the requirements set forth in 1-04.5, the Project Engineer should advise the State Construction Office and request guidance. Pending such guidance, the Project Engineer may continue to discuss the protest with the Contractor with the qualification that no final evaluation of the protest will be made until permission is received from the State Construction Office.

1-3.3A(2) Claims

If the Contractor has pursued and exhausted all the means provided in Section 1-04.5 to resolve a dispute, the Contractor may file a formal claim. A formal claim, filed in accordance with Section 1-09.11(2), is a much more structured device and demands a high level of conformance with the contract requirements. The objective is to utilize the rights that WSDOT has under the contract to identify the issues, obtain a sufficient level of information from the Contractor and limit the discussion to a defined subject matter. To accomplish this, and to maintain the Department's rights in a situation that may lead to court action and expensive lawsuits, the Project Engineer must insist on rigid conformance with the requirements of the provision. In fact, the first evaluation must not be of the claim's merit, but rather of the claim's structure and content. If the package fails the specification requirements in any way, it should be returned to the Contractor immediately with a written explanation. Conversely, if the package meets the contract requirements, then the Project Engineer must comply with the demands for WSDOT actions that are included in the same specification.

The existence of a formal claim does not diminish the responsibility of the Project Engineer to pursue resolution. The only difference is that Headquarters final approval of a proposed settlement is required. The change order settling a formal claim must include waiver language similar to the following:

"The Contractor, (company name), by the signing of this change order agrees and certifies that:

Upon payment of this change order in the amount of \$ _____, any and all claims set forth in the letter(s) to the Department of Transportation, dated _____ and signed by _____ of (company name) in the approximate amount of \$ _____, have been satisfied in full and the State of Washington is released and discharged from any such claims or extra compensation".

If the settlement is intended to close out all dispute discussions for the contract, use language similar to:

"The Contractor, (company name), by the signing of this change order agrees and certifies that:

Upon payment of this change order in the amount of \$ _____, any and all claims in any manner arising out of, or pertaining to, Contract No. _____, (including but not limited to those certain claims set forth in the letter(s) to the Department of

Transportation, dated _____ and signed by _____ of (company name) in the approximate amount of \$ _____, have been satisfied in full and the State of Washington is released and discharged from any such claims or extra compensation in any manner arising out of Contract No. _____".

1-3.3A(3) Legal Filing

Once the Contractor has submitted a formal claim in acceptable form and the State has either denied the claim or failed to respond in the time allowed, the Contractor is free to seek judicial action by filing a lawsuit or, in some cases, demanding binding arbitration. Note that the Contractor must fully comply with the provisions of Section 1-09.11 before it can seek judicial relief. Once any legal action has been started, the Project Engineer may only continue with settlement efforts if the Attorney General's office has given specific permission to do so. Such permission may be sought through the State Construction Office. Settlements of claims which have resulted in a judicial filing need review and approval by the Attorney General's office and different waiver language similar to the following:

"The Contractor, (company name), by the signing of this change order agrees and certifies that:

Upon payment of this change order in the amount of \$ _____, any and all claims in any manner arising out of, or pertaining to, Contract No. _____, (including but not limited to those certain claims set forth in the complaint filed under Thurston County Cause No. _____ (Contractor's name) vs. State of Washington), have been satisfied in full and the State of Washington is released and discharged from any such claims or extra compensation in any manner arising out of Contract No. _____".

1-3.3A(4) Final Contract Voucher Certification

In some cases, of course, the Contractor will not have been so cooperative as to participate in resolution efforts. After a protest has been disallowed, there may have been no formal claim filed and the Project Engineer really doesn't know if there is a continuing problem. The way to resolve this after the project is physically complete is to assemble the final estimate and send it to the Contractor with a Final Contract Voucher Certification (FCVC). The FCVC is the Contractor's last chance to formally file a claim. If there is no exception above the Contractor's signature on the FCVC, there is no claim. The contract will be over as soon as the State Construction Engineer accepts it. If the Contractor does not return the FCVC in a reasonable time, WSDOT may unilaterally set the completion date and process the final estimate without the Contractor's signature. Proposals to unilaterally accept a contract should be discussed with Region managers before any action is initiated.

1-3.3B Claims Against the Contractor — Damage

The Department has a claims office, now known as the Washington State Department of Transportation Risk Management Office (RMO). All receptionist job descriptions, all Region operations manuals, and all telephone training is set up to refer citizens with damage claims related to construction to the RMO and to provide the toll free number (1-800-737-0615). The RMO will react to the call, issuing claims forms, contacting the contractor, and following up on the actions taken.

The Project Engineer's role is to appropriately advise the RMO, if needed. There may be confusion about which contract is involved. Field office knowledge about the incident and the surrounding circumstances may be solicited. The contractor's insurance and the insurance provided by the Contractor for the State may be involved and information about the policy will, most likely, be requested.

If, in spite of the Department process, the claimant contacts the field office directly, the Project Engineer should refer the claimant to the State Risk Management Office (1-800-737-0615).

1-3.3C Claims Against the Contractor — Money

Claims received by the Region for money owed by the Contractor should be referred to the Contractor. A claimant should be advised of the legal right to file a lien against the retained percentage for claims involving labor, equipment, or materials used on the project and be referred to the State Accounting Services Office for obtaining the necessary lien forms.

1-3.3D Claims Against Officials and Employees

The statutes provide that claims may be filed against the State of Washington, State officers and employees, for damages resulting from their conduct and prescribes the manner in which the action must be taken. Whenever this occurs, the state will furnish the legal defense and pay any judgments if the act which caused the alleged damage was within the scope of the person's duties, was in good faith, and without negligence.

1-3.4 Stewardship

Webster defines "steward" as "one who acts as a supervisor or administrator, as of finances and property, for another or others." the designated steward of all federal highway funds is the United States Department of Transportation, acting through the Federal Highway Administration. In Washington State, FHWA is represented by its Washington Division. Washington Division has delegated a portion of its stewardship responsibility (and the corresponding authority) to the Washington State Department of Transportation through the Stewardship Plan, signed on May 17, 2001.

This section describes further agreement between FHWA and WSDOT concerning the details of the part of the stewardship agreement that applies to construction (Section III-F). The subject matter of this sub-agreement is monitoring of construction performed on behalf of WSDOT by independent contractors.

Scope of Construction Monitoring Plan

This plan deals specifically with federally-financed construction performed under contracts with WSDOT and administered through the WSDOT Headquarters Construction Office. It is not intended to be all-encompassing. Contracts for work on Ferries and Ferry facilities are not included. Contracts for work through local agencies are not included. Federally-financed utility agreements are not included. Emergency Relief work

performed by contractors and administered by WSDOT Maintenance is not included.

Project Responsibility

FHWA, Washington Division, has delegated to WSDOT (and through the WSDOT delegation of authority to the Headquarters Construction Office) stewardship responsibility and authority for all federally-funded construction except new construction and re-construction on the Interstate system and certain specially-selected areas of high interest. The special selections are made by FHWA and include significant demonstration projects, special funding agreements and projects of very high national interest.

The Construction Office has further delegated the stewardship reporting responsibility for projects with a contract value less than \$3.5 Million to the various WSDOT Regions. The delegation of stewardship authority from Headquarters to the Regions is through the *Construction Manual*.

FHWA has also delegated to WSDOT the authority to accept projects on the Interstate system that are not new construction or re-construction. This authority has been further sub-delegated to the Regions for projects with a contract value less than \$3.5 Million.

FHWA Review/Approval Actions & Related Processes

With the pre-approval of specifications and processes and the extensive delegation of stewardship authority, there are relatively few approval actions needed from FHWA during actual construction.

For new construction and re-construction on the Interstate system, FHWA has retained the oversight role of interim, or project, inspections, final inspections and acceptance, and the approval of certain high-value change orders.

The following processes will apply:

For project inspections, the WSDOT Project Engineer and the FHWA Area Engineer shall agree on the timing of such inspections. Typically, project inspections will take place quarterly, however, the Area Engineer may select other frequencies. The Project Engineer will advise the Area Engineer when agreed milestones or completion stages have been accomplished and the Area Engineer will schedule the review and prepare the report. (A similar process will be followed between the Project Engineer and the Headquarters Construction representative for delegated projects when the delegation has been retained at Headquarters. Regions will develop processes for those jobs delegated to them.)

For final inspections and acceptance, the review will be conducted in two parts. The first part will be a field review of the work and will be conducted at about the time of physical completion, when the contractor is still available to make corrections or changes identified during the review. The second part of the process will be the final acceptance review. This will be conducted after WSDOT has accepted the contract and has assembled all cost and materials documents. The second part of the review (acceptance) may be conducted with an exchange of documents and without a physical visit to the site. The Project Engineer will notify the Area Engineer when these times have arrived and the Area Engineer will schedule the reviews and will prepare one final

report summarizing both reviews. (A similar process will be followed between the Project Engineer and the Headquarters Construction representative for delegated projects when the delegation has been retained at Headquarters. Regions will develop processes for those jobs delegated to them.)

Change orders on FHWA stewardship projects may be approved by WSDOT unless they alter the termini, character or scope of work of the contract or unless they have a net value of more than \$200,000. Note: Changes that adjust quantities without changing the work may be approved by WSDOT regardless of value. FHWA approval will normally be a written formal response, but may be verbal if the public interest is served by the more timely action. In all cases, the FHWA approval of a change order shall be obtained through the Headquarters Construction Office.

The FHWA Area Engineer may also choose to accompany the WSDOT reviewer during the review of any federal-aid project. Such participation will be random and will be initiated by the Area Engineer. This participation by the FHWA will not change any delegation of oversight responsibility or authority in any way. When the Area Engineer has participated in a review, a copy of the summary report will be provided directly to the Area Engineer.

Stewardship Summary Reports

It is important to note the difference between a steward and a stewardship reviewer/reporter. Stewardship on WSDOT federal-aid projects is provided by a wide cross-section of employees who make stewardship decisions according to the requirements of the *Construction Manual* and their own delegated responsibilities and authorities. From the field inspector who observes contract work and prepares pay instructions, to the Project Engineer who reviews and approves a monthly progress payment, to the Region Construction Manager who executes a change order, to the Headquarters Construction Engineer who negotiates and approves a claim settlement, all are acting as stewards in their own job descriptions and assignments.

The stewardship reviewer/reporter, on the other hand, is acting as an overseer, observing and collecting information about all of the stewardship activities, evaluating that information, making recommendations concerning the qualification of the covered work for federal funding and preparing reports to summarize the activities. Reviewers may be FHWA Area Engineers, Headquarters Construction Engineers, Region Managers or subordinate Region specialists in documentation or contract administration. For the reports that it prepares, WSDOT may assign any person of the classification of Transportation Engineer 3 or above to this duty. The only restrictions are that the reviewer must not have been involved in the project-level administration and the report must be signed by someone with supervisory authority over the Project Engineer or management responsibility over the contract itself.

- Types of Reports

Interim Reports (also known as Project Reports) are intermediate summaries of stewardship activities on an uncompleted project. These will be performed on multi-season jobs at least annually. Interim reports may

be submitted at a greater frequency or for a special purpose at any time, at the discretion of the stewardship reviewer. Interim reports may be submitted on single-season projects for special purposes, again at the discretion of the reviewer.

Final Inspection/Acceptance Reports are single close-out reports that summarize the results of reviews conducted in two parts at the completion of all projects. The first part is a review of the field work conducted at a time when the contractor is still available to perform additional work or corrective work. The second part is after acceptance, when the final cost figures are known and the materials certification is available. For FHWA-retained projects, the final inspection and acceptance will be conducted by the FHWA Area Engineer. For delegated projects with a greater value than \$3.5 Million, the final inspection and acceptance will be conducted by a representative of the Headquarters Construction Office. For projects further delegated to a Region, the final inspection and acceptance will be conducted by a Region representative. The final acceptance portion of the final review may be done without a site visit, working from documents and computer data only.

- Timing of Reports

Interim reports will be performed at times that are appropriate for the nature and progress of the work and the seasonality of the project. These times will be determined through the judgment of the reviewer. The objective for all reviewers will be to prepare and submit interim reports within 30 calendar days after the field review.

Final inspections will be conducted around the time of physical completion, while the contractor is still mobilized and able to perform corrective or added tasks. The Project Engineer is in the best position to identify this time and shall advise the reviewer that a final inspection is needed. Final acceptance reviews will be conducted after the State Construction Engineer's final acceptance of the contract itself and after receipt of the Region's Materials Certification. The objective for all reviewers will be to prepare and submit the final inspection/acceptance report within 60 calendar days after project final acceptance.

Copies of reports prepared by FHWA will be sent to the Headquarters Construction Office. Copies of reports prepared by any WSDOT reviewer will be collected by the Headquarters Construction Office and forwarded to FHWA.

- Content of Reports

Note: As a significant part of any review, the reviewer must visit the jobsite and confirm that a project of approximately the nature and magnitude of that shown on the plans actually does exist.

Job Description A description of the major elements of the work. Include a narrative about the job. Include the contractor's name, the award date and the amount of the bid.

Time and Damages On an interim report, discuss the present status of time and its relationship to the completion status. If behind, describe what is being done to catch up. Describe any suspensions or time extensions. On a final report, discuss the final time result. If overrun, discuss liquidated damages. Subjectively, comment on the amount of time set up.

Change Orders Confirm that each change was approved according to the checklist before the work started. Evaluate the preparation of the change order and the justification. For all changes, include a statement of federal participation eligibility. Include more detailed discussions of major changes (Scope Change, Claim Settlements, Significant Actions, Over \$100,000).

Cost List the final payment, the original amount, the net effect of change orders and the mathematical calculation of net overruns/underruns. Obtain and include a general explanation of the overs and unders.

Materials On an interim report, review a process in progress by checking for submittals and approvals of RAMs, any drawing or catalog submittals, the testing method and frequency, adjustments to the ROM, observe field tests and include a summary report. Comment on the overall status of materials testing, documentation and adequacy. On a final report, review the Region Materials Certification, comment on any missing items and mention the resolution of the certification for participation purposes. Refer to the following section, "Quality Improvement and Accountability," for a discussion on selection of processes for review.

Disputes, Claims On an interim report, note any claims or major disputes presently underway. Note how previous issues have been resolved. On a final report, note any exceptions to the final voucher certification and describe the issue.

Traffic Control Comment on the adequacy of the traffic control plans. Discuss the project's use of flagging, devices, pilot cars, etc. and any unusual events during the project.

Training On an interim report, determine that a plan has been submitted and approved. Also, note the comparison between accomplished training and the completion status. Report any efforts to recover if behind. On the final report, list the amount of training originally included, any changes made to this requirement and the total amount of training accomplished.

Subcontracting Discuss the level and nature of subcontracted work. Note any DBE requirements and any change orders modifying these requirements by deleting, adding or substituting DBE commitments. Make reference to any Condition of Award requirements. Assure that mandatory DBE contracting did happen and that the DBEs performed a commercially useful function (review the On-Site reports). Review on-site reports for any DBE firm utilized, whether or not its utilization was mandatory.

Other Talk to the Project Engineer. Look for special notes. If there was an experimental spec or process, discuss it. If there was an unusual event or happenstance, discuss that. Describe the overall impression of the contractual relationship. Describe any evidence of successful collaboration between the parties. Include any other information of interest.

Communication

Much of the day-to-day communication between WSDOT and FHWA is informal in nature. Verbal discussions, telephone consultations and e-mail notices (including digital photos when needed for clarity) are used extensively. Except where formal written notices are specifically required, staff from both agencies will attempt to utilize the simplest form of communication that accomplishes the needed communication in the least time. All reports and correspondence related to a project shall bear both the WSDOT contract number and the FHWA project number as identifiers.

1-4 Utility and Railroad Relocation

1-4.1 Work Performed Under Utility Agreements

Utility agreement work associated with a contract exists in two categories. The first is work done for a utility by WSDOT that is included in the contract and performed by the WSDOT contractor. The second is work done, either by the utility or the utility's contractor, that is associated with and done near the WSDOT project.

If the utility work is included in the contract, the plans will show the work and will include pay items exactly as if the work was part of the transportation improvement. The responsibility of the Project Engineer is to treat this work the same way that "normal" work is handled. There will be a necessity for communication with the utility itself, inviting comments and joint reviews and inspection of the work. In many cases, the utility will provide materials or equipment to be incorporated into the work. The utility will also provide certification that provided material meets the requirements of the contract. If problems arise and changes are considered, there are additional paperwork demands. The Project Engineer should consult with the Utility and the Region Utility Engineer.

If the work is associated with the project, or if unrelated work is being done nearby, and the utility or its contractor is performing the work, the Project Engineer should treat the neighboring work in the same manner that adjacent WSDOT work would be treated. (See *Standard Specifications*, Section 1-05.14 and Section 1-2.2H of this manual.)

1-4.2 Work Performed Under Railroad Agreements

Railroad work associated with a contract exists in three categories. The first is work done for a railroad by WSDOT that is included in the contract and performed by the WSDOT contractor. The second is work done, either by the railroad or the railroad's contractor, that is associated with and done near the WSDOT project. The third category is railroad protective

services. Protective services, such as flagging, are typically provided by the railroad.

If the railroad work is included in the contract, the plans will show the work and will include pay items exactly as if the work was part of the transportation improvement. The responsibility of the Project Engineer is to treat this work the same way that “normal” work is handled. There will be a necessity for communication with the railroad itself, inviting comments and joint reviews and inspection of the work. In many cases, the railroad will provide materials or equipment to be incorporated into the work. The railroad will also provide certification that provided material meets the requirements of the contract. If problems arise and changes are considered, there are additional paperwork demands. The Project Engineer should consult with the Railroad Company and the Region Utility Engineer.

If the work is associated with the project, or if unrelated work is being done nearby, and the railroad or its contractor is performing the work, the Project Engineer should treat the neighboring work in the same manner that adjacent WSDOT work would be treated. (See *Standard Specifications*, Section 1-05.14 and Section 1-2.2H of this manual.)

Protective services may be called for when the Contractor is performing work on railroad facilities (first category above) or when the Contractor’s work is conflicting or adjacent to a railroad facility that is not being changed. Typically, the railroad will determine the need for service, provide the protective services, and send the bill to WSDOT. There may be an agreement in place, or the railroad’s actions may be unilateral. On all projects including railroad flagging, the Project Engineer will notify the Railroad Company when all work involving the railroad is physically complete.

The addition or revision of agreements with the railroad can be lengthy processes. The Project Engineer should stay alert for possible changes and the need for revisions to the agreement. When these arise, the Railroad Company and the Region Utility Engineer should be contacted early and often.

1-5 Surveying

1-5.1 Site Surveying

1-5.1A Permanent Monuments

Most permanent monuments which are in the construction zone are relocated by the establishing agency. Normally these monuments are relocated prior to beginning of construction, but if monuments are found within the construction zone, they must be preserved until they can be moved. If the urgency of construction does not allow time for the relocation of the monument, it must be properly referenced so it may be reset or relocated at a later time. When a monument is found within the construction area, the proper agency shall be notified promptly and requested to relocate the monument.

1-5.1B Property Corner Monuments and Markers

It is imperative that land plats and property corners be preserved. The 1973 Legislature enacted a Survey Recording Act, RCW 58.09, to provide a method for preserving evidence of land surveys by establishing standards and procedures for monuments and for recording surveys as a public record. When a general land office corner, plat survey corner, or property line corner exists in the construction zone, it is necessary to properly reference it and reset it after the construction work has been done. RCW 58.09.040 requires that, for all monuments that are set or reset, a record of the monument be filed on a Monumentation Map with the County Engineer in the county in which the corner exists and the original sent to the State Right of Way Plans Branch. Headquarters will forward a copy to DNR for their records.

1-5.1C Alignment Monumentation

During construction, alignment monumentation may be altered to fit field conditions. Such changes may include:

- Normally all PCs and PTs are to be monumented. Additional point on tangent (POT) monuments are necessary where line of sight is, or may in the future be obstructed by the horizontal or vertical alignment, buildings, or other barriers.
- When the right of way and the construction alignment do not coincide, the monumentation shall be such that the exact right of way as acquired can be positioned in the field. This will generally require, as a minimum, that the right of way alignment be monumented.
- When safety of the survey crew or survival of the monuments is an issue, monuments may be offset from the true alignment. An extra effort in accuracy must be made when setting offset monuments to ensure an accurate reestablishment of the true alignment. The monumentation, including monument locations, reference distances, stations, and bearings, is to be shown on the as built plans.

1-5.2 Construction Surveying

1-5.2A Surveying Provided by the State

Unless the contract states otherwise, the Project Engineer is responsible for providing all surveying needed to locate and define the contract work. The staking done in construction surveying must assure that the work will conform to the plans and must also conform to the Contractor’s approach to the work. There are numerous survey techniques that will accomplish these objectives. Prior to each phase of the work, the Project Engineer must reach agreement with the Contractor concerning the method, location, and timing of construction staking. Once this agreement is reached, it must be shared with all WSDOT, Contractor, and subcontractor personnel who place or use construction stakes.

1-5.2B Contractor Surveying

If the contract requires the Contractor to provide some or all of the construction surveying, the Project Engineer is required to provide only the primary control points staked, marked, and verified in the field and the coordinate information for the main alignment points in the plans. The plan alignment and the field control points must be referenced to the same grid coordinate system.

The provisions for contractor surveying are intended to provide the stakes needed to inspect the work, as well as the primary function of locating and defining the work. If the survey stakes required by the contract do not provide the reference data needed for inspection, then the Project Engineer will have to provide additional survey work that is needed. As an alternative, a change could be negotiated with the Contractor to perform the added work.

The Contractor's survey work is a contract item, just like all other contract items. It must be inspected for adequacy and conformance with the contract. Once it is performed and inspected, it must be paid for.

The wise Project Engineer will inspect the survey efforts and check as much of the contractor's work as is practical. Any errors should be brought to the Contractor's attention for corrective action. The inclusion of contractor surveying in a project transfers the risk of survey errors to the Contractor. The Project Engineer must assure that the survey work of the Contracting Agency does not relieve the Contractor of that risk.

1-5.2C Grade Control

1-5.2C(1) Subgrade Tolerance

The finish required on roadway subgrades shall ensure a final grade in as close conformity to the planned grade and cross-section as is practicable, consistent with the type of material being placed. Subgrade blue tops shall be set 0.05 foot below subgrade elevation and be accurate to + or - 0.01 foot. The finished subgrade surface shall not deviate from the plan subgrade elevation by more than +0.00 to -0.05 foot. Where excessively rocky materials are being placed, deviations in excess of the above may be accepted where, in the opinion of the Engineer, closer conformance cannot be achieved by normal procedures and with a reasonable amount of effort and care on the part of the Contractor. Conformance to grade shall be checked by rod and level, straight-edging, or other appropriate engineering method as selected by the Engineer.

1-5.2C(2) Surfacing Tolerance

Red and Yellow tops for surfacing materials shall be set accurate to + or -0.01 foot. The finish of the compacted materials shall conform to the grade established by the blue tops as closely as is practicable and in general, should not deviate from the established grade in excess of the following: ballast and base course, + or - 0.05 foot; top course for bituminous surface treatment, + or - 0.03 foot; top course for asphalt concrete, + or - 0.02 foot; surfacing under treated base course, + or - 0.03 foot; treated base under Portland cement concrete pavement, + 0.00 to - 0/02 foot.

Conformance should be checked by use of rod and levels from blue tops and/or by string-line or straight edge methods as determined appropriate by the Engineer. The above schedule refers to conformance both longitudinally and transversely to the traveled way. The outer shoulder line finished grades shall not exceed double the deviations outlined for the traveled way.

In the event that additional blue tops are not set for setting grade of surfacing courses, the grade of the surfacing shall be referenced to the earthwork subgrade blue tops and adequate controls shall be used to ensure the placement of the required thickness of surfacing and a final surface meeting the requirements outlined above.

1-6 Inspection of Course Thicknesses

Tabulated below are the permissible deviations in measured thickness for specified depths of surfacing and paving. While these are the maximum deviations that can be allowed, the Project Engineer may impose tighter requirements for conforming to the plan dimensions where there is a reason to do so.

Material	Specified Depth	Max. Allowable Deviation at Any	Average Depth Deviation for Entire Project
		One Point	
Untreated Surfacing and ATB	0 – 0.25'	-0.05'	-0.025'
	0.26 – 0.50'	-0.06'	-0.03'
	0.51 – 0.75'	-0.07'	-0.035'
	0.76 – 1.0'	-.08'	-0.04'
	Over 1.0'	-8%	-4%
Hot Mix Asphalt (HMA)			
(single-lift)	0.08 – 0.15'	-0.045'	-0.015'
(multi-lift)	0.00 – 0.25'	-0.03'	-0.01'
	0.26 – 0.50'	-0.045'	-0.015'
	0.51 – 0.75'	-0.06'	-0.02'
	Over 0.75'	-0.075'	-0.025'

For HMA overlays with a specified depth of less than 0.08 foot, it will be the responsibility of the Project Engineer to ascertain the adequacy of the overlay depth in conformance to the plan.

2-3.5C Use of Photogrammetry Service

The photogrammetry service may be used to create a 3D Digital Terrain Model (DTM) files for use with the department's current design software in order to produce cross sections, contours, and quantity information. Photogrammetry can also provide Digital Ortho Photos as a by product instead of the DTM files. The Ortho Photo has the same accuracy characteristics as a map but without the elevation data. The type and size of the project and the amount of time that can be saved will be considerations in the selection of the method of obtaining the ground line cross-sections. The Project Engineer must also ascertain that the work schedule of the Photogrammetry Section will permit them to provide the DTM files and Digital Ortho Photos by the time they are required. If proper ground control was established on the project during the design stage, considerable savings in time may be realized by using this service.

It is recommended that the State Photogrammetry Office be contacted at the earliest possible date when it is determined that this service may be needed, since the process requires significant time and the weather and position of the sun (angle of the sun's rays) in Washington can affect Photogrammetric mapping schedules by weeks or even months.

The 3D DTM files and Ortho Photos are obtained from aerial photographs and will show the ground as it existed at the time the photographs were taken. This data is measured in the Stereo plotter and transferred to computer files. The State Photogrammetry Office will design each photo mission and mapping process to best fit the needs of the project as defined by the Project Engineer. The State Photogrammetry Office maintains an active archive of each new project's files and all DTM data produced since 1989. It is easily accessible via WSDOT LAN on a file server type computer. Contact the State Photogrammetry Office for specific information on past projects and archived data.

2-4 Haul

2-4.1 General Instructions

Haul is the transportation of excavated material. Measurement and payment for haul is made on material hauled.

The measurement of haul is expressed as a unit of one hundred cubic yards hauled 100 feet.

Haul quantities can be computed using the PC and associated programs on all earthwork projects and the limits of each segment of haul and the "Haul" units can be identified.

Haul shall be calculated and included in the section from which the material is hauled. Haul on roadway quantities, including borrow obtained by the widening of cuts and including waste deposited along roadway embankment slopes, will be computed on the basis of transporting material along the centerline or base line of the highway.

2-4.2 Vacant

2-4.3 Haul on Borrow or Waste

Quantities of material hauled from a borrow site to the roadway or from the roadway to a waste site are computed normal to the long axis of the borrow or waste site. When computing the amount of haul, determination of the direction of movement of the mass and the distance it is transported requires good, practical judgment by the Engineer. The size and shape of a borrow pit and egress from the pit to the highway improvement must be considered in the proper determination of the amount of haul. The same conditions are true in the case of waste sites. Instructions herein for computing haul from borrow pits shall be applicable to computing haul to waste sites.

The long axis of the borrow pit should be used for the base line of the cross-section which, theoretically, would pass through the centers of gravity of the sections; however, the base line may approximate the centers of gravity of the sections. Borrow pits which are provided by widening of the roadway cuts would be an exception to this since the *Standard Specifications* define them as "Roadway Excavation" and not "Borrow."

The measurement of the distance from the pit to the center line of the roadway should originate at the center of mass as measured in the pit and be computed via the most direct and feasible route to the nearest practical point on the center line of the roadway.

The route of haul will be indicated on the plans, and, where possible, will be via existing roads. If no road exists, provision will be made in the plans for constructing a haul road and for rights therefor.

If the Contractor chooses to haul over a route shorter than the computed or designated route, payment for haul will be based on the length of the actual haul route. If the Contractor chooses to haul over a longer route than the computed or designated route, payment for haul will be based on the length of the computed or designated route.

2-5 Slope Treatment

2-5.1 General Instructions

Earth cuts, soft or decomposed rock cuts, and overburden in all rock cuts shall have the tops of the slope rounded in accordance with *Standard Plan* H-8 to produce an aesthetic and pleasing appearance. The slope treatment shall be constructed at the time of excavation so the material resulting from the rounding of the slopes may be disposed of along with the excavation from the cut.

The Project Engineer should go over the slope treatment procedure with the Contractor at the beginning of the excavation operation to ascertain that proper rounding is being constructed and reduce extensive reworking.

2-5.2 Measurement and Payment

Slope treatment shall be measured and paid for in accordance with Section 2-03.3(5) of the *Standard Specifications*.

2-6 Subgrade Preparation

2-6.1 General Instructions

The subgrade shall be constructed in accordance with the lines, grades, and typical sections shown on the plans or as established by the Engineer and the *Standard Specifications*.

The subgrade should be uniformly compacted to the density specified rather than to have some areas just meeting the requirements while other areas are considerably above the minimum requirements. The subgrade shall meet the tolerance in Chapter 1-6 of this manual. On some separate grading projects where the surfacing Contractor will be required or elects to trim the subgrade with an automatically controlled mechanical trimmer, the tolerances for the subgrade must be changed to provide material for the subgrade trimmer to trim, but the trimmed subgrade must meet the tolerance stated above.

After the subgrade is prepared, the Contractor shall maintain it in the finished condition until the next course of work is preformed.

2-6.2 Measurement and Payment

The quantities of work involved in constructing and maintaining the subgrade shall be measured and paid for in accordance with the provisions of Section 2-06.5 of the *Standard Specifications*.

2-7 Watering

2-7.1 General Instructions

Water shall be applied as ordered by the Engineer, in accordance with the specifications, uniformly to the material so that all of the material will have approximately the same moisture content. It is more economical and effective to apply water at night or in the early morning hours when loss from evaporation is lower. In many instances, this is the only time that it is possible to increase the moisture content to that required.

The Inspector should be alert to see that the subgrade is not damaged from too much water being applied or that more water is being applied than is necessary. Usually light applications applied more frequently are more advantageous than heavy applications. The water should not be applied on surfacing materials with such force that it will wash the fine particles off the coarser ones causing segregation.

If water is a pay item, the Project Engineer shall verify the size of the water truck by measuring or weighing and if gauges are used, he should also verify the accuracy of the gauge. A record of measurements or weights, and calculations must be made for future references.

A Daily Delivery Record, Form 422-024, showing the time of each load and where it was placed should be maintained on the project. The Inspector will issue a ticket for the amount of water used.

2-7.2 Measurement and Payment

Water shall be measured and paid for in accordance with the provisions of Sections 2-07.4 and 2-07.5 of the *Standard Specifications*.

2-8 Vacant

2-9 Structure Excavation

2-9.1 General Instructions

Before starting structure excavation, stakes should be set to locate the structure and cross-sections should be taken to determine the quantities of material involved.

During the progress of excavation, the character of material being removed and exposed should be examined to determine if it is suitable for use as backfill and to ensure that acceptable foundation conditions exist. This should be done especially on streams subject to high velocity flood water and which carry drift. Open pit excavation or "glory holes" are not allowed without permission. This specification is of special importance in application to the construction of foundations in or adjacent to running streams, where the approval of the State Construction Office should be secured.

Material obtained from structure excavation may be used for backfilling over and around the structures, for building embankments, or it may be wasted. When this material is stockpiled for backfilling, the Contractor is required to protect it from contamination and the elements. If not properly protected, the Contractor must replace the lost material with acceptable backfill material at no expense to WSDOT. The backfilling of openings made for structures must be made with acceptable material from the excavation, other acceptable backfill materials indicated in the plans and special provisions, or as specified in Section 2-09.3(1)E of the *Standard Specifications*.

When water is encountered in the excavation area, it must be removed before backfilling. Cost for accomplishing this is considered incidental and is done at the Contractor's expense unless otherwise provided for in the contract.

All excavation 4 feet or more in depth shall be shored, or protected by cofferdams or shall meet the open-pit requirements of Section 2-09.3(3)B of the *Standard Specifications*. The Contractor must submit his shoring plans in accordance with Section 2-09.3(3)D of the *Standard Specifications*. The shoring design shall be in compliance with the WSDOT Geotechnical Design Manual (M46-03), and be designed for site specific conditions, which must be shown and described in the working drawings. These drawings must be approved before construction begins. WSDOT's approval, however, does not relieve the Contractor of responsibility of satisfactory results.

The contractor shall submit working drawings and calculations for open-pit excavation, showing the geometry and construction sequencing of the proposed excavation slopes in accordance with Section 2-09.3(3)B of the *Standard Specifications*. The excavation stability design shall be conducted in accordance with the WSDOT *Geotechnical Design Manual* (M46-03) and must be designed for site specific conditions, which must be shown and described in the working drawings. These drawings must be approved before construction begins.

The Contractor shall submit detailed plans of cofferdams for approval as required in the *Standard Specifications*, Section 2-09.3(3)D when their use is required. This requirement shall be strictly followed. When a cofferdam is required on a railroad right of way, excavation must not be commenced before the plans have been approved by the railroad company. The Contractor should be notified of this requirement well in advance of starting such work, as it usually takes several weeks to get plans approved by the railroads. See Chapter 6-1.5 of this manual for the number of copies to submit and distribution of approved plans.

Cofferdams, in general, must be removed to the bed of the stream, or to below the low water mark. In some cases, it may be advisable to leave the cofferdam in place. The Cofferdam is, however, the property of the Contractor.

Sheet piling, designed in accordance with the USS Steel Sheet Piling Design Manuals, may be used for shoring walls that do not support other structures and that are 15 feet in height or less. When sheet piles are used for cofferdams, the Project Engineer shall see that the sheets are held tightly together during driving and placing, so that no cracks or holes are left, through which water can flow. If timbers are used in the cofferdam, the use of wood preservatives needs to be monitored to be sure that all environmental constraints are met. Cofferdams should be built slightly larger than the neat size shown on the plans. This is to allow for inaccuracy of driving sheet piles.

Where bearing piles are to be driven, the excavation should be carried deeper to allow for upheaval of soil due to pile driving. This extra depth will depend on the character of the material. Usually in sand and gravel from 6 inches to 1 foot and in a river or tide mud from 1 foot to 1.5 feet is sufficient. Such over-excavation is the Contractor's responsibility. Over-excavation shall be backfilled with gravel backfill to the footing elevation if the upheaval is less than anticipated.

In soft mud, when the driving of piles tends to liquefy the foundation material, it is sometimes necessary to excavate below plan grade and backfill with gravel before concrete is placed. When the Engineer considers this to be necessary and approval of the State Construction Office has been secured, the additional excavation shall be paid for at the unit contract price for structure excavation and the gravel backfill shall be paid for on force account basis or at an agreed price.

Excavations shall be carried to the elevation shown on the plans or as established by the Engineer. The Project Engineer should take into consideration the fact that when a clamshell bucket is used, it is very difficult to clean the hole to an exact given elevation. For direct-bearing footings, the corners and sides of the excavation should be cleaned out as well as possible and there should not be an excess of loose material left in the bottom. If the character of the material found at plan elevation is questionable, consult the Regional Materials Engineer.

When the excavation for the footing has been completed, elevations to establish the footing elevation shall be taken in the corners of any footing and recorded in the project records.

The material on which spread footings are to be constructed must be adequate to support the design soil pressure per square foot (meter) shown in the plans. The Regional Materials Engineer should be consulted to review the foundation conditions if the bottom of the footing is materially different than what is identified in the contract plans. If a change of design or the lowering of a footing appears to be advisable, the State Construction Office must be advised.

Occasionally, foundations adjacent to large piers are founded at a higher elevation than the large pier foundation. In these cases, the Contractor must carry on operations so that the foundation at the higher elevation will not be disturbed when excavation is made for the lower pier.

Backfilling holes made for piers and column bents up to the surface of the surrounding ground may be done at any time after the forms are removed, providing the backfilling is brought up evenly on all sides of the pier or column.

Backfilling around piers and bents in streams shall be done carefully with material suitable to resist scour, and be brought up to a height not less than the original bed of the stream. Embankment backfill against abutments, piers, walls, culverts, or other structures shall not be placed until the concrete has attained 90 percent of its design strength and has cured for at least 14 days or as otherwise specified in the contract.

It is very important that drainage be provided in back of retaining walls, tunnels, and structures having wing walls or abutments to eliminate excessive soil pressure. Weep holes shall be placed as shown on the plans and as low as possible. Gravel backfill for walls or other suitable materials shall be placed directly behind the structure. If drainage is a major problem, it may be necessary to also construct perforated drain pipe or French drains behind the structure.

The construction of embankments and backfill around bridge ends shall be in accordance with Section 2-03.3(14)I of the *Standard Specifications*. The fill around bridge ends shall be brought up equally on all sides of the bracing, columns, and bulkheads to avoid distortion and displacement of these members.

In addition, Section 2-03.3(14)I of the *Standard Specifications* requires that the superstructure be in place before the backfill behind an abutment can be placed. It further states that this requirement can be waived by the Engineer provided the Contractor submits abutment stability calculations to back up their proposal. When designing the bridge, the designers check the abutment stability using the final condition which includes the dead load of the superstructure. This superstructure dead load increases the resistance to sliding and reduces the overturning moment of the abutment. Since placement of the backfill prior to placement of the superstructure is a condition not analyzed by our designers, we require that stability calculations be submitted for each bridge by the Contractor to reflect this unchecked condition. These stability calculations need to include a surcharge load of at least 2 feet to account for the live loading due to the backfill equipment weight.

Around structures and bridge ends, where rollers cannot operate, compaction shall be obtained by the use of mechanical tampers. Density tests shall be taken frequently enough to ensure that compaction is continued on each lift until the specified density is attained.

Structure excavation is classified into two classes. The excavation necessary for the construction of bridge footings, pile caps, seals, wing walls, and retaining walls is classified as Structure Excavation Class A. All other Structure Excavation is classified as Structure Excavation Class B. See Sections 2-09.3(2), 2-09.3(3), and 2-09.3(4) of the *Standard Specifications*.

2-9.2 Measurement and Payment

Structure excavation shall be measured and paid for in accordance with the provisions of Sections 2-09.4 and 2-09.5 of the *Standard Specifications*.

2-10 Ditch and Channel Excavation

2-10.1 General Instructions

Areas where open ditches are to be constructed shall be cleared and grubbed the same as areas for roadway excavation.

The excavated material may be used for the construction of dikes, berms, or otherwise disposed of as shown on the plans or as directed by the Engineer. The materials should not be placed in embankments unless it is suitable for embankment construction.

2-10.2 Measurement and Payment

Ditch and channel excavation shall be measured and paid for in accordance with the provisions of Sections 2-10.4 and 2-10.5 of the *Standard Specifications*.

2-11 Trimming and Cleanup

2-11.1 General Instructions

This work shall consist of dressing and trimming the entire roadway or roadways improved under the contract. The shoulders, ditches, and back slopes shall be trimmed to the specified cross-section to produce a neat and pleasing appearance. All channels, ditches, and gutters shall be opened up and cleaned to ensure designed drainage. This includes existing drainage within the project limits specified in the contract.

2-11.2 Measurement and Payment

Trimming and cleanup will be measured and paid for in accordance with the provisions of Sections 2-11.4 and 2-11.5 of the *Standard Specifications*.

2-12 Construction Geotextile

2-12.1 General Instructions

Construction geotextile fabric needs to be fully covered at all times until placement. It should be stored in a protected area off the ground and away from items that can cause damage such as sunlight, heat, precipitation, chemicals flames including welding sparks and any other environmental

condition that may damage the physical properties of the fabric.

The area to be covered should be graded to a smooth, uniform condition free from ruts, holes, and protruding objects such as rocks and sticks. The fabric needs to be placed immediately ahead of the covering operation with as few wrinkles as possible. The material should not be dragged through the mud nor over sharp or protruding objects which could damage the material.

The cover material is to be placed in front of the placing equipment. This equipment should be sized to minimize the rutting that may occur during the placement. Turning of vehicles on the first lift of material may cause damage to the fabric and should not be allowed.

Sewing of seams is described in Section 2-12.3 of the *Standard Specifications*

Fabric damaged during placement needs to be repaired as soon as possible. The backfill material needs to be removed and the fabric repaired either as recommended by the manufacture or as listed in the contract. Visible evidence of damaged material may include subgrade pumping, intrusion of subgrade, or roadbed distortion.

2-12.2 Placement

Section 2-12.3 of the *Standard Specifications* lists the required placing and lapping requirements for each type of use of construction geotextile. Following is a short explanation for the placement types.

1. **Underground Drainage** — The fabric is used as a wrap around the drain rock and the pipe to not only separate the backfill material from the drainage material but also to act as a filter of fine sands and silts. This prevents the fines from flowing into the drain rock and clogging the drainage system.
2. **Separation** — The fabric is placed directly on a subgrade that contains a large amount of fine sand and silts. Normally the subgrade can be constructed during fair weather, however, almost any amount of moisture can make working on the grade impossible.
3. **Soil Stabilization** — Soft subgrade that cannot support the weight of equipment constructing the roadbed, is usually removed, a fabric placed and covered with backfill. This allows a stable enough surface to continue construction. Here the fabric not only separates the two materials but also adds strength to the roadbed.
4. **Permanent Erosion Control and Ditch Lining** — The fabric is utilized to reduce or minimize the ground surface's exposure to erosion. The material is placed directly on the surface to be protected and then backfill is placed over the fabric. Rock surfacing should not be placed in a lined ditch under the fabric as this would allow the water to erode the ground under the fabric thus eliminating its effectiveness.
5. **Temporary Silt Fences** — As the title states, the fabric is used to trap silt and other fine particles from continuing from the project site to open water.

2-12.3 Measurement and Payment

Construction geotextile will be measured and paid for in accordance with the provisions of Sections 2-12.4 and 2-12.5 of the *Standard Specifications*.

5. After each roller pass, a density reading is taken with the nuclear gauge at the test spot.
6. After finish rolling, densities are then to be determined at two additional locations, 15 to 25 feet each side of the test spot and in line longitudinal with the direction of paving. Evaluation of the compactibility of the mix shall be made on the average of the three densities.
7. If the average test spot density is greater than 92 percent, but less than 96 percent of Rice density for wearing courses or less than 98 percent of Rice density for base and leveling courses, a satisfactory test section has been completed. If the test section values are beyond these limits, the mix design should be changed. The State Materials Laboratory can provide assistance as needed.

The test section should be repeated when:

1. The results of previous tests are not considered by the Engineer to be reliable.
2. The Engineer directs a change in mix composition. Note that slight adjustments in bin masses are not considered a change in mix composition.
2. Routine control tests indicate changes from results found in previous qualifying test sections. (In this instance, the Inspector should check the contractor's rolling pattern for changes and check plant test results for mix changes. Any changes should be noted on the compaction report.)

Compaction Control

Compaction is controlled by testing with the nuclear density gauge for all classes of HMA where the paving is in the traffic lanes and compacted course thickness is greater than 0.10 foot. The nuclear gauge testing shall be conducted in accordance with current test methods. The specification requirements shall be a quality level of 1.00 or greater referenced to a minimum density of 91 percent of the maximum density (Rice density) as determined by WSDOT FOP for AASHTO T 209.

Cores of the finished pavement may be substituted for nuclear gauge readings to determine densities, provided they are requested by the Contractor by noon of the next day after paving. If this alternate is done at the request of the Contractor, and the cores show the materials to be outside specification limits, WSDOT shall be reimbursed for the coring expenses at the rate of \$125 per core, and the Contractor shall bear any additional costs incurred by the Contractor for Traffic Control. If the cores show the materials to be within specification limits, then there will be no charge for the cores, and WSDOT will bear any additional costs incurred by the Contractor for Traffic Control.

Control lots not meeting the prescribed minimum density standard of 0.75 CPF need to be evaluated for removal and replacement with satisfactory material. At the Engineer's option, control lots with a CPF between 0.75 and 1.00 may be accepted at a reduced price in accordance with current policies.

For preleveling mix, the compaction control shall be to the satisfaction of the Engineer.

For all other conditions, the Contractor shall construct a test section in accordance with instructions from the Engineer. The number and timing of passes with an approved compaction train that will yield maximum density with the nuclear gauge in the test section shall be used on all succeeding paving. The Inspector should make sure the Contractor is making the required number of passes and reconstruct a test section if conditions change.

5-4.2B(4) Miscellaneous Duties of the Street Inspector

When constructing plant-mixed pavement adjoining gutters, curbs, cold pavement joints, manhole castings, etc., the Inspector shall see that all contact surfaces are painted with an approved asphalt material before placing the adjoining pavement.

A detailed Inspector's Daily Report (Forms 422-004, 422-004A, and 422-004B) shall be kept by the Inspector, noting all unusual occurrences, orders received from the Project Engineer, orders issued to the Contractor, and other pertinent information.

The Asphalt Concrete Pavement Compaction Report, Form 350-092, shall be prepared by the Density Inspector and distributed as shown on the form.

5-4.2B(5) Multiple Asphalt Plants

When two or more asphalt plants are used on one project, the mix from each plant must be placed with separate paving machines and compaction equipment. This is necessary because of the required adjustments on each paving operation to accommodate the different mixes and the various rolling patterns that may be necessary. Otherwise the test sections would not reflect true data for compaction controls due to different characteristics for the different aggregates or asphalt plants.

5-4.2B(6) Weed Control Under Asphalt Pavement

Weeds cause considerable damage to thin asphalt pavements such as sidewalks, shoulder overlays, and asphalt lined ditches. It is typically recommended that chemical weed control be used under all asphalt pavements less than 0.35 foot in depth unless a full depth base preparation was included in the construction. Check the contract requirements to see if soil residual herbicide is required.

5-4.2C How to ...

Calculate Approximate Paver Speed for Continuous Operation

To assist in working with the Contractor to determine paver speeds, the following formula can be used to calculate approximate speeds required to handle various production rates at varying depths. Section 5-04.3(3) of the *Standard Specifications* requires the paving machine to be operated at a uniform speed consistent with the plant production rate and compaction train capacity, which will allow a smooth, *continuous* paving operation.

$$S = [(T \div 0.076) \div (W * D)] \div 60$$

where: T = Tons per hour
 W = Width in feet
 D = Depth in feet
 S = Paver speed in feet per minute

Based on 2.052 tons per c.y. =
 0.076 tons per c.f.

Compute Yield

During the paving operation, a careful record shall be kept, showing truckloads, the weight of each truck and other pertinent data. Periodically, the Inspector shall compute the quantity of mix placed per square yard, and shall compare the yield against the proposed quantities. Overruns or underruns in quantities may be avoided by making a constant check of quantities placed.

HMA pavements are designed on a weight-volume relationship of 137 pounds for one square yard of pavement of a compacted depth of 0.10 foot. It is the intention in the construction of the pavement to spread the mixture according to an average yield in pounds per square yard.

Remember that the minimum compacted depth of pavement must also be met. If the aggregates are heavier than anticipated when the quantities were computed, or if the surface that the pavement is being constructed on is not true, the average yield can be attained without meeting the minimum thickness requirement.

Weigh tickets shall be collected and a daily total weight of mixture received shall be obtained and entered on the daily report for submission to the Project Engineer. To eliminate possible errors, totals as recorded by the Plant Inspector shall be compared against the total obtained by the Street Inspector. Careful attention given to those details may save argument with the Contractor concerning pay quantities.

Determining Minimum Lift Thickness

On occasion, the thickness of an individual lift of HMA is not specifically indicated on the roadway sections, or a contractor requests permission to place the HMA in more than one lift. Although maximum lift thickness is specified in the Standard Specifications, there is no guidance as to the minimum.

Lift thickness is governed by aggregate size. Adequate lift thickness ensures proper aggregate alignment during compaction, so that density and an impermeable mat can be achieved. Lifts placed too thin can lead to aggregate segregation, tearing, more rapid cooling and it is generally more difficult to achieve proper density and pavement smoothness. As a guide, the following table may be used to determine the minimum lift thickness for the various classes of mix.

HMA Class	Minimum Lift Thickness (feet)
Superpave 3/8"	0.08
Superpave 1/2"	0.12
Superpave 3/4"	0.20
Superpave 1"	0.25

5-4.3 Mix Design

Establishing Mix Proportions

The Contractor is required develop a mix design for each of the classes of HMA in the contract. When the contractor has completed a mix design it is submitted to the Project Engineer along with representative samples of the mineral materials that will be used for HMA production. The mix design and samples are shipped to the State Materials Laboratory in Tumwater for verification of the mix design.

During production it may be necessary to make adjustments in aggregate gradation and asphalt content on the job to fit field requirements such as workability, compactibility, and volumetric properties (Va, VMA and VFA). Section 9-03.8(6)A of the *Standard Specifications* provides the limits of change, both for the aggregate and the asphalt binder content, that can be approved by the Project Engineer. These changes can be made at the request of the contractor provided the change will produce material of equal or better quality. The Project Engineer may order a change in the asphalt binder content.

Adjustments for asphalt binder content greater than ± 0.3 percent may be approved by the State Materials Laboratory or the State Construction Office. Based on past experience in the Region, the Regional Administrator or the Regional Construction Engineer may wish to change the asphalt content beyond the $\pm 0.3\%$. To accomplish this, the Region may direct the Project Engineer to increase or decrease the asphalt content by notifying the Project Engineer in writing, or by e-mail, and sending a copy of this direction to the State Materials Laboratory. It is intended that this action include consultation with the State Materials Laboratory or the State Construction Office to provide the best asphalt paving material possible.

During construction, guidance for adjustments is provided through the use and interpretation of the compaction test sections and compaction control testing results.

The Contractor's plant operator shall be advised of all results of sampling and testing performed so that the proper gate settings may be established at the cold aggregate feeders.

6-1	Structures, General Requirements	6-1
6-1.1	Bridge Construction De-Briefing Session	6-1
	6-1.1A General Inspection Procedures	6-1
6-1.2	Foundations	6-1
6-1.3	Clearing the Site	6-2
6-1.4	Alignment and Grade of Railings	6-2
6-1.5	Working Drawings	6-2
6-1.6	Approval of Materials	6-3
6-1.7	Safety Nets and Staging	6-3
6-1.8	Working in Water	6-3
6-1.9	Final Cleanup	6-4
6-1.10	Concrete Placement Checklist	6-4
6-1.11	Inventory Inspection	6-4
6-1.12	Falsework	6-4
<hr/>		
6-2	Concrete Structures	6-4
6-2.1	Proportioning and Mixing Concrete	6-4
	6-2.1A Mix Designs	6-4
6-2.2	Inspection of Concrete Production Facilities	6-4
	6-2.2A Prequalification Inspection	6-4
	6-2.2B On-Site Inspection of Trucks	6-6
	6-2.2C Verification Inspection	6-6
6-2.3	Concrete	6-6
	6-2.3A General	6-6
	6-2.3A(1) Weather and Temperature Limits	6-7
	6-2.3A(2) Acceptance of Concrete	6-8
	6-2.3B Bridge Deck Construction	6-9
	6-2.3B(1) Placing Concrete in Hot Weather	6-9
	6-2.3B(2) Placing Concrete in Cold Weather	6-10
	6-2.3C Use of Epoxy Resins	6-10
	6-2.3D Finishing Structures	6-10
	6-2.3D(1) General	6-10
	6-2.3D(2) Formed Surfaces	6-11
	6-2.3D(3) Roadway Slabs and Bridge Approach Slabs	6-11
	6-2.3E Drilled Shaft Foundations	6-11
	6-2.3F Curing Concrete	6-11
	6-2.3G Test Cylinders	6-12
6-2.4	Concrete Seals and Cofferdams	6-12
6-2.5	Pier, Column, and Wall Concrete	6-13
6-2.6	Concrete Structures	6-13
	6-2.6A Forms and Falsework	6-13
	6-2.6B Traffic Barrier, Pedestrian Barrier, and Rail Bases	6-15
	6-2.6C Reinforcing Steel	6-15
	6-2.6D Welding Reinforcing Steel	6-17
6-2.7	Prestressed Concrete Girders and Piles	6-17
	6-2.7A Shop Inspection of Prestressed Concrete Products	6-18
	6-2.7B Prestressed Girder Camber	6-18
	6-2.8 Post-Tensioned Bridges	6-19
6-2.9	Measurement and Payment	6-22

6-3	Steel Structures	6-22
6-3.1	General	6-22
6-3.2	Layout	6-23
6-3.3	Handling and Storing Material	6-23
6-3.4	Straightening Bent Material	6-23
6-3.5	Setting Anchor Bolts and Masonry Plates	6-23
6-3.6	Erection of Steel	6-24
6-3.6A	Assembling	6-24
6-3.6B	High-Strength Bolts	6-27
6-3.6C	Welding	6-29
6-3.7	Placing Concrete Roadway Slab	6-29
6-3.8	Railings	6-30
6-3.9	Painting	6-30
6-3.10	Measurement and Payment	6-30
<hr/>		
6-4	Timber Structures	6-30
6-4.1	General	6-30
6-4.2	Storage and Handling	6-30
6-4.3	Framing	6-30
6-4.4	Field Treatment of Timber	6-30
6-4.5	Painting	6-30
6-4.6	Measurement and Payment	6-30
<hr/>		
6-5	Piling	6-30
6-5.1	General	6-30
6-5.2	Treated Timber Piling	6-30
6-5.3	Precast Concrete Piling	6-30
6-5.4	Cast-in-Place Concrete Piling	6-31
6-5.5	Vacant	6-31
6-5.6	Steel Piling	6-31
6-5.7	Pile Driving	6-31
6-5.7A	General	6-31
6-5.7B	Test Piles	6-34
6-5.7C	Pile Driving Records	6-34
6-5.8	Measurement and Payment	6-34
<hr/>		
6-6	Bridge Railings	6-34
6-6.1	General	6-34
6-6.2	Measurement and Payment	6-35
<hr/>		
6-7	Painting	6-35
6-7.1	General	6-35
6-7.2	Cleaning Metal	6-35
6-7.3	Applying Paint	6-36
<hr/>		
6-8	Waterproofing	6-36

6-1 Structures, General Requirements

6-1.1 Bridge Construction De-Briefing Session

In an attempt to continually improve the quality of bridge contract plans, specifications and estimates and to obtain feedback on engineering and construction practices, the Bridge and Structures Office is available to assist in conducting post construction De-Briefing Sessions for “Capturing Lessons Learned”. The purpose of these De-Briefing Sessions is to provide designers with feedback on positive things that worked well and things that could be improved.

The Project Engineer, Bridge Technical Advisor, or Bridge Design Unit Manager should consider initiating a De-Briefing Session on those projects where they feel feedback to the designers would benefit the quality of future construction plans. Suggested projects include Bridge Rehabilitation Projects, Bridges with complex staging, substructure conditions, or new material applications. Suggested attendees at these sessions should include Region Project Office Staff, Headquarters Construction, Bridge and Structures Office, Design Consultants, and the Contractor involved in the structural work.

The Bridge and Structures Office will assist the Project Engineer in organizing and facilitating the De-Briefing Session once it is agreed to go forward with a De-Briefing Session. The Project Engineer will be responsible for making all contacts with Contractor personnel.

The Project Engineer should determine the timing of the De-Brief session with respect to the contract work. Scheduling the session too long after the contract work is complete may diminish the Contractor’s willingness to participate or recall of the issues for discussion. Scheduling a session too soon before completion of all contract related activities may cloud issues currently under discussion. The Project Engineer should exercise caution in selecting the proper timeframe for this session.

More information on these sessions, including De-Brief Meeting guidelines, typical agenda, and De-Brief report outline, are available on the Bridge and Structures Office’s homepage at <http://www.wsdot.wa.gov/eesc/bridge/cecw/index.cfm>.

6-1.1A General Inspection Procedures

Because of the wide variety of types and designs of structures, the Inspector should be thoroughly familiar with all of the contract documents as they provide the specific materials requirements, dimensions, and other details that make each structure unique. The Inspector should examine the contract documents extensively by:

Thoroughly reviewing *all* contract documents, including:

- The plans and special provisions for the project.
- The appropriate *Standard Specifications*, supplemental specifications, and standard drawings that apply.
- Any contractor-provided documents, such as traffic control plans, falsework and forming plans, shoring plans, and shop drawings for prefabricated items.
- Check with the Region’s Environmental Section to verify that all necessary environmental documentation has been obtained for the project and is current.
- Special care needs to be taken over streams that are subject to the Endangered Species Act (ESA) as the requirements and the regulations are constantly changing and may change during the life of the contract.

Checking and verifying all:

- Plan dimensions,
- Elevations, and
- Materials quantities.

List any discrepancies that are discovered and report them to a supervisor (along with any items that may require clarification).

Set up part of the inspection documentation records in advance so that the actual dates, dimensions, quantities, and other values can be more easily filled in as the work progresses.

When inspectors cannot participate directly in a preconstruction meeting, they should check with the Project Engineer after the meeting to identify any areas of special concern.

6-1.2 Foundations

Elevations of bottoms of footings, as shown in the plans are determined from information secured from test holes or borings or other sources. The Project Engineer shall observe the character of the materials removed to confirm the material is similar to that identified in the test borings. If the material is similar, they shall note the elevation of such material and approve the footing elevation. If the material differs from the test borings, the State Construction Office shall be consulted for an evaluation. Except in solid rock foundations, it is necessary to carry all footings well below any possible line of scour. Footings in streams are often carried to greater depths in hard material than they would be in the same material where danger of scour does not exist. Footings on solid rock shall be well keyed into the rock to prevent sliding of the structure. Keys should not be less than 1 foot (300 millimeters) deep and the rock surface should be rough so it has more value as a key. Arch abutments may be designed with bottoms on an inclined plane. Care must be taken that the rock or other material is cut as nearly

as possible to the plane shown. If this cannot be done, the material should be removed to a satisfactory foundation, cross-sections taken and the State Construction Office should be advised and requested to secure a new design of the abutment. Material at the heel, or back of the abutment, shall be carefully removed and all loose material removed. In placing concrete in arch abutments, the concrete is placed directly against the undisturbed foundation material at the back of the abutment for the reason that an arch abutment is subject to very high vertical and horizontal loads. Footings in hard material are sometimes sloped or stepped. Steps must be carefully made and if the material is not hard enough to stand vertically the steps shall be inclined or beveled. The slope shall not be steeper than the angle of repose. Backfilling to level up foundations or to fill holes will not be allowed except by permission of the State Construction Office. Under certain conditions, permission will be granted to fill a hole with a lean concrete mix. If the design soil pressure is low, unsuitable material may be replaced by granular material compacted to 95 percent density. If there is no contract unit price for the replacement material, an agreed unit price must be secured. Just prior to placing concrete, all loose material shall be removed and, if in the dry, shall be well sprinkled with water before concrete is placed.

The following are the approximate bearing values (in tons per square foot) of various materials encountered in foundation excavations:

Alluvial Soil	½ to 1 ton	50 to 100 kPa
Ordinary clay	1 to 2 tons	100 to 190 kPa
Dry, stiff clay	2½ to 3 tons	240 to 290 kPa
Confined sand	3 to 4 tons	290 to 380 kPa
Ordinary sand and gravel	2 to 3 tons	190 to 290 kPa
Cemented sand and gravel	5 to 10 tons	480 to 960 kPa
Solid rock	5 or more tons	480 or more kPa

6-1.3 Clearing the Site

The Contractor shall clear the site of the proposed structure of all trees, brush, stumps and debris for the full width as required and in the manner specified in Section 2-01 of the *Standard Specifications*. Existing bridges, buildings or obstructions shall be removed as provided in the contract or the *Standard Specifications*.

Payment for clearing and grubbing and removing structures and obstructions shall be as provided in the contract. If no specific payment is provided, this work is considered to be incidental to the construction.

The removal or relocation of public or private utilities encountered on the site will be as provided for under the terms of Section 1-07.16 of the *Standard Specifications*.

The Project Engineer shall make a thorough study of the various public utilities involved with respect to the construction of the new work, noting the clearances required for all power and telephone lines and poles, sewer and water lines; tracks, trolley lines, ditches, signals, etc., on

railroad grade separations; and possible interference with or inconvenience to adjoining property. The Project Engineer shall ascertain from the Regional Utilities Engineer if notification has been given to utilities for required movement of lines so that the construction is not delayed.

6-1.4 Alignment and Grade of Railings

Bridge traffic barriers, curbs, bridge railings and rail bases shall be carefully aligned to give a pleasing appearance. See Chapter 6-6 of this manual for further instructions.

6-1.5 Working Drawings

The Contractor is required to submit for approval detailed plans for falsework, concrete forms, cofferdams, shoring, and cribbing. These plans must comply with the requirements of the contract plans and specifications and shall be designed under the supervision of or by a Washington State licensed professional engineer and shall bear their seal and signature.

If appropriate, the plans should include:

1. Ground line at time of construction when falsework, shoring, and cribbing are involved.
2. Horizontal clearances to adjacent roadways, existing structures, and railroads when shoring and cribbing are involved.

A change order is required for any deviation from the contract. Deviation from an approved working drawing requires Headquarter's approval. The Project Engineer must receive approval of these plans before the Contractor is permitted to start construction of the structure.

If a project has a large number of working drawings associated with it the Project Engineer should talk to the contractor about prioritizing his submittals. The project engineer should share this information with the State Bridge and Structures Engineer so that the review process can be accomplished in the most efficient manner for the contractor.

The Contractor shall submit six complete sets of plans directly to the State Bridge and Structures Engineer (or Terminal Design Engineer — Ferries Division) for review and approval, and two complete sets to the Project Engineer for information. If a railroad is involved, four additional sets shall be submitted to the State Bridge and Structures Engineer (or Terminal Design Engineer) for each railroad company involved. See the Shop Plans and Working Drawings Table in Chapter 1-2.4H of this manual.

The Project Engineer will review the plans to see that they comply with the requirements of the contract and send any comments to the State Bridge and Structures Engineer (or Terminal Design Engineer) about any field conditions or contract deficiencies that would affect the checking of the plans.

When preapproved formwork plans are used, the Contractor shall submit two sets of the plans to the Project Engineer. The Project Engineer must then advise the Contractor that construction may proceed unless a field condition needs to be resolved before doing so. If a railroad is involved, four additional sets shall be submitted to the State Bridge and Structures Engineer for each railroad involved. The State Bridge and Structures Engineer (or Terminal Design

Engineer) will return two copies to the Project Engineer with the notations made by the railroad. The Project Engineer will then advise the Contractor that construction may proceed utilizing any notations given by the railroad.

The Contractor must allow sufficient time for review and approval of the working drawings. It usually takes two to four weeks for review and approval and if a railroad is involved, this time is increased to four to eight weeks. The Project Engineer should alert the Contractor to this time requirement and urge them to submit their plans sufficiently in advance of their need. If the plans are incomplete or unsatisfactory, the time required to get final approval is increased.

Falsework shall be supported on piling unless the State Bridge and Structures Engineer (or Terminal Design Engineer) approves the use of mudsills in lieu of piling. When mudsills are proposed and indicated by the Contractor on the falsework plans, the Project Engineer must provide the State Bridge and Structures Engineer (or Terminal Design Engineer) with information regarding the soil conditions and allowable soil pressures. Soil condition information and allowable bearing values shall be obtained from the State Materials Engineer if unavailable in the contract plans.

When mudsills are approved, they shall be placed on undisturbed firm soil or on fill compacted to 95 percent density. The loose upper layer of soil shall be removed and the firm soil below shall be fine-graded to provide firm, even bearing over the entire area of the mudsill. If placed on sand, gravel or other material which can be displaced sideways, the bottom of the mudsill shall be set about 6 inches (150 millimeters) below the normal surface of the surrounding area. Posts should be centered on the mudsills. Mudsills shall be constructed to distribute the load from the post to the soil with very little deflection or settlement.

Falsework piling shall be driven in accordance with the specifications for permanent piles of the same material unless alternate criteria is shown on the Contractor's falsework plans. The falsework piling shall be driven to develop a bearing value as shown on the approved falsework plans. Allowance for settlement must be made for all spans, as the amount varies, depending on the character of foundations and the number of joints of timber. Piles and timbers should be carefully cut to fit, thereby reducing settlement of the falsework.

Forms for concrete deck on steel or prestressed concrete girder spans shall be fully supported on the girders. They shall in no case extend to the ground unless the steel girders are also supported on piles or posts.

The Project Engineer shall see that the falsework and forms are constructed in accordance with the approved plans. If it becomes necessary, or the Contractor desires to deviate from the approved plans, a revised plan for approval shall be submitted and the Contractor shall not start construction in accordance with the revised plan until receiving approval of the revision. All revisions to the approved plan shall be reviewed by the State Bridge and Structures Engineer (or Terminal Design Engineer) to ensure the structural integrity of the falsework and formwork.

6-1.6 Approval of Materials

The Project Engineer shall notify the Contractor that approval of all materials used in permanent structures is required. Contractors frequently list only the local suppliers and not the material. This should be discussed with the Contractor at a preconstruction meeting. Particular care should be used to see that this requirement is met in regard to minor parts and materials such as drains, bearings, expansion dams, bolts, pins, and paints. It should also be impressed on the Contractor that inspection of all materials is required before they are used and that the best time for inspection is generally before the materials are shipped. Contact the State Materials Lab for inspection services.

Prefabricated materials, such as structural steel and cast steel, are fabricated in accordance with approved shop plans, submitted by the Contractor, and approved by the Bridge and Structures Engineer. Erection of unapproved prefabricated materials shall not be allowed.

6-1.7 Safety Nets and Staging

Fall arrest and protection shall be provided. Reference WAC 296-155-24510, Fall Restraint Systems, and WAC 296-155-24510, Fall Arrest Systems. A Fall Protection Work Plan shall be on site.

Section 1-05.6 of the *Standard Specifications* requires the Contractor to furnish sufficient, safe and proper facilities such as walkways, railings, ladders, and platforms for inspection of the work. The Project Engineer should insist that the Contractor provide safe facilities and should not permit WSDOT personnel on the project when it is not safe for them.

6-1.8 Working in Water

When working in water, the Project Engineer shall see that the Contractor complies with the requirements of the specifications and the various agencies for pollution control and navigation. If the contract requires the Contractor to obtain special permits, the permits shall be obtained before the work covered by them is begun. In the event of a fuel or oil spill, the Contractor is required to notify the Coast Guard immediately, regardless of the amount of the spill or the efforts for containment.

Whenever construction work is performed in navigable waterways, it is necessary to obtain a construction permit from the Coast Guard. One of the requirements of the construction permit is regular submission of Bridge Construction Progress Reports. Two copies of the report should be prepared by the Project Engineer sufficiently in advance of the first working day of the month and transmitted to the State Bridge and Structures Engineer. One additional copy of each report must be forwarded by the Project Engineer to the State Construction Engineer.

The Bridge Construction Progress reports shall be made in the form of a print of the Coast Guard Bridge Permit exhibit sheet. The print shall be marked in green to show construction progress of permanent work, in red to show work scheduled for completion in the next month, and blue to show current location of falsework supports and other

temporary obstructions to navigation, such as anchor lines, or moored barges. Supplemental sketches may be required for clarity. The memo forwarded to the State Bridge and Structures Engineer should include information about any activities planned for the next month that could affect waterway users.

When a Coast Guard permit modification is proposed (by the Contractor or WSDOT), it shall be submitted to the Bridge and Structures Engineer for processing through the Coast Guard. The time required for approval/disapproval of the proposed permit modification is variable and depends on the nature and significance of the modification. Up to six months may be required.

When all construction obstructions to navigation have been removed, the Project Engineer shall report that fact immediately to the State Bridge and Structures Engineer indicating the date removal was completed.

Upon completion of all permitted bridge work, a final report indicating the date of completion and certifying that the bridge has been constructed in compliance with the Coast Guard Bridge Permit shall be submitted by the Project Engineer to the State Bridge and Structures Engineer.

6-1.9 Final Cleanup

When the structure is completed, the Contractor shall clean up the site and remove all materials and debris. The decks of the structures shall be swept and washed clean. The Contractor shall level off and fine grade all excavated material not used for backfill, and fine grade around all piers, bents, abutments, and on slopes so that the entire site and structure is left in a clean and presentable condition.

Upon completion of the work, all falsework piling, cofferdams, shoring, curbs, and test piles shall be removed to a minimum of 2 feet (0.6 meter) below the finished ground line. Removal limits within a stream or channel are described in Section 2-09.3(3)D of the *Standard Specifications*.

6-1.10 Concrete Placement Checklist

The Concrete Placement Checklist was developed as an inspection aid. See Figure 6-1. The use of this checklist is encouraged.

6-1.11 Inventory Inspection

After a permanent or temporary bridge or a bridge modification is complete and preferably before opened to traffic, the State Bridge and Structures Office's Bridge Preservation Section needs to perform an inventory inspection. The purpose of this inspection is to field verify certain contract plan details, to provide a base-line condition assessment of the bridge, and to identify any potential problem features.

When the bridge is nearing completion, two to four weeks before completion, the Project Engineer should notify the State Bridge Preservation Engineer of the anticipated completion date. The Bridge Preservation Engineer will make arrangements with the Project Engineer for an inventory inspection.

When load or width restrictions are in force on a temporary structure, immediate notification should be provided when service is discontinued on the temporary structure and traffic is rerouted to the permanent structure.

6-1.12 Falsework

Falsework construction is a critical part of the bridge construction process. Generally, the factor of safety used for design of falsework is less than that of permanent construction. Therefore, it is extremely important that the falsework is constructed in accordance with the approved falsework drawings. Any changes to the approved falsework drawings must be approved by the Bridge and Structures Office.

6-2 Concrete Structures

6-2.1 Proportioning and Mixing Concrete

Mix design, proportioning, and mixing concrete is the responsibility of the Contractor. General information regarding proportioning and mixing concrete is provided in Appendix A at the end of this chapter to provide a better understanding of the variables involved.

6-2.1A Mix Designs

The *Standard Specifications* require the Contractor to provide a mix design for all classes of concrete specified in the Plans except for those accepted based on a Certificate of Compliance. The mix design should be submitted on Form 350-040 Proposed Mix Design. The Project Engineer should review all Contractor proposed mix designs for conformance to the contract. Specific items to look for are:

1. There is at least the minimum cement content specified in Section 6-02.
2. The minimum amount of fly ash (if called for).
3. The amount of fly ash (if used) does not exceed 35 percent.
4. The amount of ground granulated blast furnace slag (if used) does not exceed 25 percent, or the combination of slag and fly ash does not exceed 35 percent.
5. The aggregate conforms to Section 9-03.
6. Air entrainment is included if required.

6-2.2 Inspection of Concrete Production Facilities

6-2.2A Prequalification Inspection

All concrete production facilities which produce concrete other than commercial or lean will be prequalified. Commercial concrete and lean concrete may be batched in production facilities which are not prequalified.

The concrete production facility prequalification shall be accomplished by one of the following methods.

Concrete Placement Checklist	
Location _____ (span, pier, station)	Contract No. _____
Part of structure being cast _____ (seal, footing, deck, etc.)	Structure _____
Concrete scheduled for _____ (a.m.) (p.m.) on _____ (time) (day of week and date)	Inspector _____
Weather forecast is _____	Date _____
<p>1. Foundation:</p> <p>A. Spread Footing:</p> <ul style="list-style-type: none"> <input type="checkbox"/> cross-sections recorded prior to excavation <input type="checkbox"/> excavated to plan elevation <input type="checkbox"/> foundation approved by the Project Engineer (if foundation material differs from the test borings, consult Olympia Service Center Construction Office) <p>B. Pile Supported Footing:</p> <ul style="list-style-type: none"> <input type="checkbox"/> excavated to plan elevation <input type="checkbox"/> pile order length given to contractor (if required) <input type="checkbox"/> pile driving completed and accepted <input type="checkbox"/> pile cutoff elevations checked <input type="checkbox"/> pile cutoff treated (timber) <p>2. Falsework:</p> <ul style="list-style-type: none"> <input type="checkbox"/> constructed per approved F/W drawings <input type="checkbox"/> tattleails set and checked after first placement <input type="checkbox"/> foundations (mudsills or piling) constructed per specifications and falsework drawings <p>3. Forms:</p> <p>A. Approved Form Drawings:</p> <ul style="list-style-type: none"> <input type="checkbox"/> dimensions verified <input type="checkbox"/> elevations checked <input type="checkbox"/> longitudinal and transverse form alignment checked <input type="checkbox"/> studs and walers in accordance with approved drawing <input type="checkbox"/> plumb and/or batter checked <input type="checkbox"/> form material of proper thickness, grade and grain orientation, facing, and in satisfactory condition <input type="checkbox"/> form liner approved <input type="checkbox"/> kickers and braces in accordance with approved drawing <input type="checkbox"/> ties, bolts, nails, etc., in accordance with approved drawing <input type="checkbox"/> forms coated with a release agent <p>Concrete Placement Rate: _____ m/hr. at _____ °C</p> <p>B. Construction Joints:</p> <ul style="list-style-type: none"> <input type="checkbox"/> location checked <input type="checkbox"/> construction joint properly formed, braced, and aligned <input type="checkbox"/> shear keys fabricated to proper size and correctly placed <input type="checkbox"/> construction joint elevation checked <input type="checkbox"/> existing concrete at the construction joint is cleaned, roughened, and wetted <input type="checkbox"/> open or dummy joints formed and located in accordance to the plans <input type="checkbox"/> premolded joint filler secured 	
<p>4. Reinforcing Steel:</p> <ul style="list-style-type: none"> <input type="checkbox"/> cut sheets reviewed <input type="checkbox"/> mill certificates received <input type="checkbox"/> bar sizes, number, and spacing checked <input type="checkbox"/> bottom and top concrete cover and side clearances checked <input type="checkbox"/> bar ties and supports in accordance with contract <input type="checkbox"/> splice locations and lengths checked (welded or mechanical splice approved) <input type="checkbox"/> alignment and length of bars extending into future work checked <p>5. Post-Tensioning:</p> <ul style="list-style-type: none"> <input type="checkbox"/> approved shop drawing received <input type="checkbox"/> trumpet, distribution plate, and reinforcement correctly located and secured <input type="checkbox"/> duct sizes, material, and wall thickness checked <input type="checkbox"/> ducts installed per approved profile and alignment <input type="checkbox"/> ducts securely tied <input type="checkbox"/> ducts free of holes and dents <input type="checkbox"/> duct joints sealed <input type="checkbox"/> ducts clear and unobstructed <input type="checkbox"/> inlets, outlets, vents, and drains properly installed <input type="checkbox"/> contractor prepared to clear all ducts immediately after concrete placement <p>6. Method of Concrete Placement:</p> <ul style="list-style-type: none"> <input type="checkbox"/> pump <input type="checkbox"/> pump backup system available <input type="checkbox"/> bucket <input type="checkbox"/> chute <input type="checkbox"/> tremie <input type="checkbox"/> other list: _____ <p>7. Concrete:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Concrete Class _____ <input type="checkbox"/> 28 day strength _____ MPa <input type="checkbox"/> specified slump _____ mm (max.) <input type="checkbox"/> specified air entrainment _____ % <input type="checkbox"/> flyash <input type="checkbox"/> air-entraining admixture, Brand _____ <input type="checkbox"/> water-reducing admixture, Brand _____ <input type="checkbox"/> retardant admixture, Brand _____ Estimated Concrete Quantity: _____ cubic meters <p>Inspector: _____</p> <p>Date: _____</p>	

Figure 6-1

1. Certification by the National Ready Mix Concrete Association (NRMCA). Information concerning NRMCA certification may be obtained from the NRMCA at 900 Spring Street, Silver Springs, MD 20910 or online at www.nrmca.org. The NRMCA certification shall be good for a two year period.
2. Independent evaluation certified by a Professional Engineer using NRMCA checklist. The Professional Engineer shall be licensed under title 18 RCW, state of Washington, qualified in civil engineering. The independent certification using the NRMCA checklist shall be good for a two year period.
3. Inspection conducted by the Plant Manager, defined as the person directly responsible for the daily plant operation, using the NRMCA Plant Certification checklist. The Plant Manager certification shall be done prior to the start of a project, and every six months throughout the life of the project.

The Contractor is required to submit Form 350-071, Request for Approval of Materials Source, listing the name and location of the plant which will supply the concrete and also the source of the cement, aggregates, and admixtures that will be used in the concrete. Concrete from the plant shall not be used until the plant has been approved. The Project Engineer shall take approval action based upon the batch plant prequalification submittal meeting the requirements of the Standard Specifications, Sections 6-02,3(4)A and the Approved Source of Material Listing. If the batch plant prequalification submittal indicates that the scale certification has expired the Project Engineer shall confirm that the scales have been recertified or the source will not be approved.

6-2.2B On-Site Inspection of Trucks

Whenever ready mix concrete is used on the project, the Inspector shall be alert to the condition of the trucks being used for delivery. Inspectors need to check that all delivery trucks have operational counters and a device to measure the amount of water added at the site. All trucks are required to be operated within the rated capacity stated on the manufacturer's data plate. The Inspector needs to check the concrete being discharged down the chute to ensure the concrete is uniformly mixed. If the concrete does not appear uniformly mixed inspect the drum of the delivery truck checking that the drum blades have no appreciable accumulation of hardened concrete, and the blades are free of excessive wear. If the drum has appreciable accumulation of hardened concrete or excessive blade wear is noted, the delivery truck needs to be rejected.

6-2.2C Verification Inspection

When necessary, the Project Office shall make an inspection of the batch plant to confirm: the accuracy of the batching process; that the scales have current certifications; the accuracy of the water metering devices; and to sample the coarse aggregate and fine aggregate.

6-2.3 Concrete

6-2.3A General

Type III portland cement shall not be allowed in any concrete structure unless called for in the plans or specifically approved by the State Construction Office. The use of Type III cement in structures is not desired because it is believed to reduce the resistance of the finished surface to weathering, particularly to freezing and thawing cycles and is more subject to plastic and shrinkage cracking. If it is necessary or desirable to place structural concrete in service prior to the time stated in the *Standard Specifications*, authority must be obtained from the State Construction Office. In such cases, test cylinders from each pour are taken and tested by the Contractor to determine the early break strength.

All sawdust, nails, dirt, and other foreign material, including ponded water, must be removed from within the forms and the forms shall be inspected and approved before placing any concrete.

The bottom of footings and forms must be thoroughly soaked with water prior to placing the concrete so they do not absorb water from the concrete mix. Care must be taken to be sure there is no ponded water when placing the concrete.

Vibrators are usually specified to be used when placing concrete. Their use is important for the purpose of consolidating the concrete in the forms, thus producing a dense uniform concrete.

Adequate vibration is necessary for placing concrete in difficult places, such as under and around closely spaced reinforcement. When steel forms are used for curbs, traffic barriers, or rail bases, external vibration may be required to eliminate voids at the surface caused by entrapped air. It is desirable to have the Contractor designate one person to operate the vibrator. This person could then be instructed in its use and an effort could be made to have that person kept on the same work whenever it is required.

The quantity of mixing water to be used shall be the minimum amount possible to produce the required workability. Vibrators shall be used only in freshly placed concrete. As soon as the concrete is dumped it should be spread out and vibrated by inserting the vibrator torpedo directly into the fresh concrete. However, it should be kept in one place only long enough to make the concrete uniformly plastic. Dependence should not be placed on the vibrator to work the concrete into corners and along the faces of the forms. Metal or wooden spades should be used to whatever extent is necessary in places where the vibrator cannot be satisfactorily employed, however, spades should be used only to accomplish complete filling of the forms and not for the purpose of puddling the concrete.

In regard to the desired consistency of concrete and the use of vibrators, the *Standard Specifications* should be carefully studied and followed. Every effort should be made to see that the specifications are followed.

Air-entrained concrete is required in all structural concrete above ground. The use of air entrained concrete below the finished ground line is optional with the Contractor.

The specifications require that construction joints shall be located and constructed as shown in the plans. Approval to add, move, or delete construction joints must be obtained from the State Construction Office. Section 6-02.3(12) of the *Standard Specifications* requires that shear keys shall be provided at all construction joints unless a roughened surface is shown in the plans, and where the size of keys is not shown in the plans, they shall be approximately one-third of the area of the joint and approximately 1½ inches (40 millimeters) deep.

Construction joints are to be either vertical or horizontal. Wire mesh, wire lath, and other similar items can be used for a roughened surface construction joint but shall be removed and the joint cleaned before making the adjacent pour. Construction joints in roadway slabs and approach slabs must be formed vertical and in true alignment. An edger shall not be used on the joint but lips and edgings must be removed before making the adjacent pour. If the joint is properly formed, a good straight edge will be obtained with a minimum amount of lips and edgings to be removed.

Shear keys in construction joints shall be formed with 1½-inch (40 millimeter) thick lumber and shall be constructed the full size shown in the plans. For box girder webs, these shear keys are normally shown in the plans to be full width between stirrups. The specifications require shear key forms to be left in place at least 12 hours after the concrete has been placed. The plans will indicate certain joints to have a roughened surface. These joints shall be finished and prepared for the next pour in accordance with the instructions given in the specifications or as shown in the plans.

Expansion dams or the expansion dam blockout shall be carefully placed before concreting the roadway decks. They shall also be carefully aligned for crown and grade.

Blockouts for expansion joint seals must be carefully formed to the dimensions shown in the plans for proper placement and operation. Be sure to check that the rebar in the blockout does not conflict with the expansion joint anchors. The joint seal must be placed using a lubricant adhesive.

Concrete shall be placed in accordance with the requirements of Section 6-02.3(6) of the *Standard Specifications*. The Inspector should be alert to see that any method of placing concrete that causes segregation of the concrete mix be discontinued. Some of the conveyor belt systems tend to cause segregation of the mix after several exchanges from one belt to another. The Inspector shall see that the length of conveyor belt is limited so segregation does not occur. Aluminum pipe or sheeting shall not be used in contact with fresh concrete.

In heavily reinforced sections, the maximum concrete slump may be increased 2 inches (50 millimeters) with the use of a high range water reducer, as discussed in Section 6-02.3(4)C of the *Standard Specifications*. It is anticipated that possible candidates for this increase of concrete slump may be columns, cross-beams, and post-tensioned box girder web walls and other heavily reinforced members.

6-2.3A(1) Weather and Temperature Limits

Concrete may **not** be placed when rain is hard enough to:

- Cause a muddy foundation.
- Wash or flow the concrete.

The temperature of the concrete for cast-in-place concrete must be between 55 F (13°C) and 90 F (32°C) during placement. The temperature for precast concrete that is heat cured must be between 50 F (10°C) and 90 F (32°C).

The air temperature must be at least 35 F (2°C) during and for seven days after placement (unless the contractor has an approved cold weather plan).

The temperature measuring device shall be capable of measuring the temperature of freshly mixed concrete to ±1 F (±1°C) with a range of 0 F to 130 F (-18°C to 54°C).

Hot Weather Placement (Air Temperature Above 90 F (32°C))

- Cool the component materials of the mix, transport and placement equipment, and the contact surfaces at the site.
- Methods shall be preapproved by the Engineer.

Cold Weather Placement

- Concrete shall not be placed against any frozen or ice-coated foundation, forms, or reinforcement.
- A preapproved plan for cold weather placement and curing is required, if temperatures are below 35 F (2°C) or anticipated to be below 35 F (2°C) in the next seven days.
- Heat aggregate and/or water to maintain mix temperatures above 55 F (13°C).
- Control temperature and humidity after placement by:
 - Enclosing concrete.
 - Heating to 50 F to 90 F (10°C to 32°C) for seven days.
 - Add moisture for six days (discontinue 24 hours before heat is stopped).
 - An accurate recording thermometer is required.
 - Corners and edges require special attention to prevent freezing.

When heating water and aggregates, the approximate resulting temperature for a batch of concrete can be estimated from the following formula:

$$X = \frac{Wt + 0.22W't'}{W + 0.22W'}$$

Where

- X = temperature of the batch
- W = weight (mass) of the water
- W' = weight (mass) of the aggregates and cement
- t = temperature of the water in degrees F
- t' = temperature of the aggregates and cement

6-2.3A(2) Acceptance of Concrete

The Contractor is required to provide a certificate of compliance for each load of concrete delivered to the job. Based on who is supplying the mix, the format of the certification may vary. All certifications must contain the information required by the *Standard Specifications*. If a Contractor Certification sheet is not provided by the Contractor, the form provided by WSDOT may be used.

Example forms are available as follows:

1. Manufacturer's Certificate of Compliance for Ready Mix Concrete (Form 450-001)
2. Batching Process Verification for Ready Mix Concrete (Form 350-012)
3. Proposed Mix Design (Form 350-040)

A Certificate of Compliance is all that will be required for acceptance of commercial and lean concrete. It is advised that as inspectors are collecting the Certificate of Compliance (batch ticket), they do a visual inspection of the concrete. Visual inspection should verify that the items listed on the batch ticket are included in the mix. If the concrete does not appear satisfactory for its intended use, it should be rejected.

Prior to Placement

It is the responsibility of the Inspector to compare the actual batch weights (masses) on the concrete delivery ticket to the proposed mix design weights (masses). The cement, coarse and fine aggregate weights (masses) are required to meet the following tolerances:

Concrete batch volumes less than or equal to 4 cubic yards:

Cement	+5% and -1%
Aggregate	+10% and -2%

Concrete batch volumes greater than 4 cubic yards:

Cement	+5% and -1%
Aggregate	+2% and -2%

If the total cementitious material weight is made up of different components, the component weights shall be within the following tolerances of the amount specified in the mix design:

Portland cement weight	+5% and -1%,
Fly ash weight	+5% and -5%
Microsilica weight	+10% and -10%.

For all mix designs the water weight (mass) shall not exceed the maximum water specified in the mix design. These batching tolerances apply to all mixes.

Acceptance testing will be performed by WSDOT in accordance with WSDOT standard test methods and Field Operating Procedures. Lean concrete and commercial concrete will be accepted based on a Certificate of Compliance, provided by the supplier as described in Section 6-02.3(5)B of the *Standard Specifications*. All other concrete will be accepted based on conformance to the requirements for temperature, slump, air content for concrete placed above finished ground line, and the specified compressive strength at 28 days.

The Inspector must be familiar with the type of concrete mix and who is responsible for the mix. The Contractor is responsible for the mix design and is responsible for 28-day strength.

The Inspector must be prepared to test materials for conformance. The Inspector must also be prepared to deal with nonconformance.

Preparation as a concrete testing inspector requires knowledge of concrete properties and construction procedures. Knowledge of how to use testing equipment and understanding the reliability of testing is also important. A continual evaluation of the testing equipment is needed to be sure it is operating and performing as required. Care and caution are recommended when transporting testing equipment and handling test materials, i.e., cylinders, molds, fresh concrete cylinders, and other samples).

Slump Acceptance

The maximum slump for vibrated and nonvibrated concrete is listed in [Section 6-02.3\(4\)C](#) of the *Standard Specifications*.

When a high range water reducer (super plasticizer) is used, the maximum slump limit may be increased an additional 2 inches (50 millimeters) while the concrete is affected by the admixture.

Air Content Acceptance

All cast-in-place concrete above the finished ground line shall be air entrained. The air content shall be a minimum of 4.5 percent and a maximum of 7.5 percent, unless otherwise specified.

When commercial concrete is placed in sidewalks, curbs, and gutters, air content is very important. It is recommended that the inspector perform air content testing sufficient to ensure that the concrete has between 4.5 and 7.5 percent air entrainment.

The Contractor may elect to use air entrained concrete below finished ground line. If so, the 28-day compressive strength shall meet the requirements for the class of concrete specified.

Placement Time

It is the Inspector's job to ensure that:

- The concrete is placed in the forms as soon as possible after mixing, but no later than 1½ hours after cement is added to the mix.
- The concrete is always plastic and workable while being placed.
- The concrete is placed continuously with interruptions no longer than 30 minutes.
- Each layer of concrete is placed and consolidated before the preceding layer takes initial set. Initial set has begun if the vibrator will not penetrate the preceding layer under its own weight while being operated.

The discharge time may be extended to 1¼ hours if the temperature of the concrete being placed is less than 75°F (24°C). With the approval of the Project Engineer, this may be extended to two hours, if the temperature of the concrete being placed is less than 75°F (24°C). If it is apparent that

the 30-minute time limit will be exceeded for a continuous pour, a construction joint should be established. The State Construction Office shall be contacted when this occurs. A vibrator can be used to determine if initial set has taken place when evaluating the need for a construction joint as described previously.

In certain instances, it may be difficult to meet the above criteria due to long transit times. The *Standard Specifications* allow the Contractor the option of requesting in writing to extend the time for discharge. The extension of time will be considered on a case by case basis and requires the use of specific retardation admixtures and coordination with the State Construction Office.

Point of Acceptance

Acceptance tests for specification compliance are to be determined from samples taken at the discharge of the placement system for bridge decks, overlays, bridge approach slabs, and barriers, and at the truck discharge for all other placement. For bridge decks, overlays, bridge roadway slabs, bridge approach slabs, and barriers, acceptance samples should be taken as close to the point of deposition as possible. (e.g., taking a sample from the end of a pump down below the bridge instead of up on the deck is not acceptable as it may have substantially different characteristics.)

If a pump is used as a placement system, the initial acceptance test must be delayed until the pump has been cleared of all initial priming slurry. Do not allow placement of pump slurry in the forms.

The Inspector should arrive in advance of the concrete placement and prepare the testing location. It is the Contractor's responsibility to provide adequate and representative samples of the fresh concrete to a location designated by the Engineer. Above all, the equipment must be in good working condition with records of the last calibrations for the air meter and scales. The Inspector should have all the information, including the mix design, and all the forms needed for documentation of the placement operation.

Retesting Concrete

Once the Contractor has turned over the concrete for acceptance testing, no more mix adjustment will be allowed. The concrete will either be accepted or rejected.

Multiple Placements from One Concrete Truck

Only one set of acceptance tests are required per concrete truck.

6-2.3B Bridge Deck Construction

Bridge deck construction is critical because this part of the structure receives the most abuse from traffic and the environment. Construction of maintenance-free bridge decks requires close attention to details. One or two weeks before placing the concrete in the deck, a placement conference should be held to go over the procedures to be used and to emphasize the critical areas of construction. As a minimum, this should include a discussion of the rate of placement, personnel and equipment and backup equipment to be used, type of finish, and curing details. The rate of placement should normally provide for at least 20 feet (6 meters) of finished deck per hour.

The position of the reinforcing steel is very important because of the thin concrete section. Adequate blocking and ties are necessary to hold the steel in place. If foot traffic on the reinforcing steel causes it to deflect, the spacing of the chair supports is not adequate. A pre-check of the screed setting for proper elevations and clearances to the reinforcing steel is essential prior to any concrete placement. The finishing machine should be run the full length of the placement after the screed is adjusted to check deck thickness and cover of the reinforcing steel, this check should also continue over all bulkheads and expansion joints to verify their clearances. The finishing machine should not be adjusted while it is finishing concrete to clear bulkheads and expansion joints. These adjustments must be made prior to the concrete placement. During the placement, frequent checks should be made of the actual cover obtained directly behind the finishing machine and recorded in the Inspector's Daily Report.

Quality concrete is required, particularly in the bridge deck. Uniform consistency of the concrete should be maintained throughout the placement. The water-cement ratio is very important. It should be the minimum possible to produce the required workability and not exceed the specification limit. To keep the water-cement ratio as low as possible, the specifications require the use of a water reducing additive for all bridge deck concrete. Frequent checks of the free water contained in the aggregates is necessary to determine the amount of water actually contained in the concrete mix.

6-2.3B(1) Placing Concrete in Hot Weather

When the concrete is being placed in the bridge deck during hot weather, additional precautions must be taken in order to prevent surface evaporation. See 6-02.3(6)A for estimated evaporation rates.

The temperature of the concrete at the time it is placed in the forms must be kept under 90 F (32°C). Concrete with high temperature loses slump rapidly and is difficult to place and finish. This temperature can be controlled by shading the concrete trucks while loading and unloading and shading the conveyors or pump lines used in placing the concrete. The forms and reinforcing steel should be cooled prior to placing the concrete. This can be done by covering them with damp burlap and then spraying them with cool water immediately prior to placing the concrete. Care must be taken to see there is no standing water in the forms when the concrete is placed.

Water reducing retarder admixture should be used in the concrete so the water-cement ratio and slump of the concrete can be maintained within the specification limits. The mixing time of the concrete should be held to the minimum. The concrete must be placed and finished as soon as possible. If there is a delay in applying the curing compound after the concrete has been finished, a fog spray should be applied to reduce the moisture loss due to evaporation. If plastic cracks form and the concrete is still in a plastic state, they can be eliminated by revibrating the concrete and refinishing. Care must be taken to not revibrate the concrete after initial set has been obtained.

The requirements for curing the concrete shall be enforced. As soon as the visible bleed water has evaporated from the finished deck, the curing compound should be applied. The curing compound should be applied in two applications to ensure full coverage of the concrete. The second coat should be applied in a direction perpendicular to that of the first application. The amount of curing compound applied in the two applications should meet the minimum amount specified. Immediately after application of the curing compound and initial set, the concrete deck should be covered in accordance with Section 6-02.3(11) of the *Standard Specifications*.

In summary, the difficulties arising from hot weather concreting may usually be minimized by:

1. Using cool mixing water.
2. Keeping the aggregate temperature as low as is economically feasible.
3. Reducing the length of mixing time.
4. Placing the concrete as soon as possible after mixing and with a minimum of handling.
5. Keeping the surfaces shaded during placing.
6. Placing curing compound as soon as possible.

6-2.3B(2) Placing Concrete in Cold Weather

Several precautions must be taken when placing concrete in cold weather. If temperatures below 35 F (2°C) are anticipated within seven days following placing the concrete, the Contractor will normally be required to enclose the structure and provide heat and moisture so the concrete will obtain its initial strength without freezing. The addition of moisture should be discontinued 24 hours before discontinuing the heat so there will not be an excess of moisture on the surface of the concrete to form ice in case of cold weather following the seven-day protection. If the temperature is below 35 F (2°C) when placing the concrete, the concrete must be heated to at least 60 F (16°C) by heating the aggregate and/or water in accordance with the *Standard Specifications*. The temperature of the concrete, as well as the slump, must be consistent from batch to batch.

When heating water and aggregates, the resulting temperature for a batch of concrete can be computed from the formula in Chapter 6-2.3A(1) of this manual.

6-2.3C Use of Epoxy Resins

Quite frequently, the use of epoxy resin systems on our projects is considered; either at the design stage or during the progress of a contract. Generally this use is in connection with repair of distressed concrete or in setting rebar.

Epoxy resins are quite versatile materials and are capable of providing the answer to numerous bonding or grouting problems. However, like a number of products, there is a tendency to treat them as a universal cure-all and they occasionally are applied without proper consideration of inherent limitations.

Epoxy systems are capable of providing many different properties through the formulation of their various components. To a certain extent, the systems can be tailored to fit the particular need and conditions of time, temperature, humidity, etc., that will prevail. Use of a material under conditions beyond those for which it was formulated can result in considerable trouble rather than benefit. Probably the greatest potential for trouble exists in the use of epoxies at temperatures below which a normal reaction can occur. Generally speaking, unless a specially formulated epoxy is being used, trouble can occur when application is attempted below 50 F (10°C).

The State Materials Engineer is available as a technical resource on the use of such systems, in the resolution of pertinent problems should they occur during preliminary design considerations, or as a result of problems during construction. It is strongly recommended that any contemplated use of epoxy resin systems at application temperatures below 50 F (10°C) be checked with the State Chemical Materials Engineer to forestall potential difficulties.

If epoxy resin is used, the following elements need to be carefully checked by the Inspector:

- Proper mixing and curing of the epoxy resin.
- Temperature and/or moisture limitations of the epoxy being used.
- That the areas are clean and prepared in accordance with the manufacturers recommendations.
- That the epoxy covers the entire repair area.
- That the epoxy fills the entire space between bar and the hole (if bars are being set with epoxy resin).
- That the epoxy is still tacky (not set) when it is being used to bond two structural elements together (just before elements are put together).

For setting rebar or anchors, it is best to determine the volume required to be filled by the epoxy and measure the epoxy being used. A method of measurement should be agreed to with the Contractor for inspection purposes. Also, occasional samples should be taken of the epoxy resin being placed to be sure it is setting up properly. If there is any question of filling the void or adequacy of the epoxy resin, the Inspector shall advise the Contractor, document the discussion, and report it to the Project Engineer.

6-2.3D Finishing Structures

6-2.3D(1) General

As soon as possible after the forms are stripped, the concrete surfaces shall be examined and all lips or edgings where form boards have met, shall be removed with a stone or sharp tool. Bolt holes and rock pockets shall be filled with cement mortar and floated to a smooth finish. The mortar patch shall be the same color as the adjoining concrete surfaces. Finishing of concrete surfaces shall be done in accordance with the provisions of the *Standard Specifications* and Special Provisions.

The amount of work necessary to complete the finishing satisfactorily, depends entirely on the quality of the original concrete work. If the forms have been poorly constructed and the concrete surfaces are rough and uneven, it will be necessary for the Contractor to do sufficient rubbing and finishing after the forms are removed to secure a satisfactory job. Grinding leaves a surface that is off color and should be kept to a minimum.

6-2.3D(2) Formed Surfaces

The primary purposes of finishing formed surfaces are:

- To seal the surface from water and other elements that can rust or corrode metal ties and reinforcement within the concrete.
- To provide a uniform, pleasing appearance for surfaces that will remain visible to the public.

There are two different classes of finish. They are:

Class 1

- All rail bases, curbs, traffic barriers, pedestrian barriers, and ornamental concrete members.
- As designated in the Plans and in accordance with Section 6-02.3(14).

Class 2

- Required for all other surfaces.

See the *Standard Specifications* for additional requirements.

6-2.3D(3) Roadway Slabs and Bridge Approach Slabs

Finishing of roadway slab and bridge approach slab surfaces shall be as outlined in Section 6-02.3(10) of the *Standard Specifications*. The principal objectives to be attained are a good wearing surface and a smooth riding roadway. The Engineer should ensure that adequate preparation has been made to do a good job in accordance with the specifications.

The Engineer should insist that a float be available. When a good strike-off and finish has been obtained by a finishing machine, floating may be, and should be, kept to a minimum because excess floating can be detrimental. A light aluminum float carefully and sparingly used will not harm a well finished deck, but will expose poor adjustment and misuse of a good machine. It will also smooth out mortar ridges left by the finishing machine and seal the surface. **The Contractor is required to check the deck with a 10-foot (3-meter) straightedge immediately after it is floated.**

Low and high spots can possibly be corrected by operating the finishing machine over the area (if the concrete is still plastic).

The Engineer should be cautioned that hard floating of the concrete surface with aluminum floats may cause a chemical reaction between the aluminum and the fresh concrete which could decrease the strength of the concrete at the surface of the concrete. Excessive wear or pitting of the aluminum float could be an indication that chemical reaction is taking place between the float and the concrete.

It is important that the texturing comb be used when the concrete is at the proper consistency. If the concrete is too soft, it will not retain the proper texture obtained by the comb and, if the concrete is too hard, the proper texture will not be achieved. The comb should be set up and ready to use well in advance of the time it will be required. Surface texturing is normally done with a comb except when an overlay is required.

The finished and cured deck slabs must be checked with a 10-foot (3-meter) straightedge and corrected by cutting down the high spots and building up low spots until the entire surface comes within the specified tolerance.

Sidewalks shall be finished smooth with a wood float and then brushed with a fine bristle brush. Use an edger tool at all joints and edges. Block lines on sidewalk surfaces are not desired on structures.

6-2.3E Drilled Shaft Foundations

Drilled shaft foundation construction is often very technical and is always critical because the shafts are supporting the structure. Any shaft foundation malfunction will be devastating both economically and safety wise. Construction of maintenance free bridges requires close attention to details during the construction of drilled shaft foundations.

Training on shaft construction is available through the State Construction Office. The training covers specifications, equipment, site geological conditions, and general questions.

At least one week before any drilled shaft foundation work is done, a conference should be held to go over the procedures and equipment to be used and to emphasize the critical areas of construction. As a minimum, this meeting should include a discussion of the contractor's shaft installation plan and order of work. In addition to this discussion, both WSDOT personnel and the Contractor's personnel should discuss specifics of the project; such as, site subsurface conditions, site access, traffic control, staging areas, excavation disposal, protection of the environment, etc.

Meeting attendees should include key personnel from WSDOT, the Prime Contractor, and the shaft drilling Contractor. The WSDOT personnel should include the Project Engineer representatives, a Geotechnical Engineer from the State Materials Laboratory, and a representative of the State Construction Office.

6-2.3F Curing Concrete

Proper curing of concrete is important to securing strong, good wearing concrete and in reducing cracking. Curing periods and methods specified should be strictly observed.

The last step in ensuring a good concrete job is to provide proper curing. Concrete begins to cure from the time cement and water are added in the mixing chamber and continues for many years after. Concrete is very susceptible to damage during initial curing, if proper steps are not taken. Three of the most important factors are:

1. Surface drying (evaporation).
2. Rapid temperature changes between segments of the concrete as it is curing.

3. Stresses or loads applied before the concrete has reached adequate strength.

All of the specifications regarding curing, form removal, hot and cold weather concreting, etc., are designed to provide protection for the concrete during this critical stage. For example: If the surface begins to dry, the surface will begin to shrink and cracking can occur. To prevent this, the Inspector should be aware that fog misting, curing compounds, wet blankets, plastic sheeting, etc., are designed to be applied **before** surface drying begins to prevent loss of surface moisture. Some concrete mixes such as microsilica and latex are very susceptible to surface drying and require closer attention due to the effects of thin lift application.

Note: Curing compounds are not chemicals that cure concrete. They prevent water loss by forming a waterproof membrane.

Like most materials, concrete expands when heated and contracts when cooled. Therefore, the concrete should not be subjected to extreme temperature changes as hardening takes place.

Hardening of concrete is also slowed down by cooler weather. Concrete must not be exposed to freezing conditions to avoid permanent damage.

Concrete (as it hardens) contains a high percentage of moisture and could crack if the water in the mix freezes and expands. Air entrainment will not protect the concrete from damage during the initial curing period.

Summary

1. Prevent surface moisture loss.
2. Maintain constant temperature (no freezing).
3. Prevent stress loads.

6-2.3G Test Cylinders

Concrete test cylinders shall be molded in forms conforming to the requirements for single use molds as detailed in ASTM M 205. Cardboard test cylinder molds shall not be used.

See Chapter 9 of this manual for instructions for making, curing, and shipping concrete test cylinders and for the number of test cylinders to be made.

Extra cylinders that are tested for early removal of forms and falsework shall be the responsibility of the Contractor. Early cylinders are cylinders tested in advance of the design age of 28 days. Their purpose is to determine the in place strength of concrete in a structure prior to applying loads or stresses. The Contractor shall retain an independent testing laboratory to perform this work. This lab shall be approved by the Engineer.

The cylinders shall be cured in accordance with WSDOT FOP for AASHTO T23. Special cure boxes to enhance cylinder strength will not be allowed. The number of early cylinder breaks shall be in accordance with the Contractors need and as approved by the Engineer.

Prior to the removal of any forms, the Contractor is required to furnish the Engineer with all test results. Forms shall not be removed without approval of the Engineer.

If set retarders are used in a mix, the State Materials Lab should be consulted for curing, handling, and storage instructions prior to use.

6-2.4 Concrete Seals and Cofferdams

When constructing foundations in streams and other locations below water, it is usually necessary to place a concrete seal in the cofferdam so that the cofferdams may be dewatered. The weight of the concrete seal resists the buoyant force on the cofferdam when it is dewatered. Seal concrete is placed underwater by means of a tremie. Concrete pumps may be used.

Handling of the tremie requires the use of a crane to raise and lower it into place. Hand winches are sometimes used in small seals but they must be equipped with a brake and drum for quick release and stop.

The tremie pipe shall be at least 10 inches (250 millimeters) in diameter, made of heavy steel pipe, with flange or sleeve connections. Sleeve connections are preferable for seals placed in pile foundations. Flanges sometimes hang up on tops of piles and the concrete charge is lost. The tremie pipe must be absolutely water tight, at the joints as well as at the connections to the hopper. The hopper should be of at least, one-half cubic yard (one-half cubic meter) capacity.

Before any concrete is placed, the bottom of the tremie pipe shall be sealed with a plug. A satisfactory plug can be made with a 2-inch (50-millimeter) board slightly larger in diameter than the tremie pipe; on top of this board fasten a ¾-inch (19-millimeter) round piece cut to the neat size of the inside of the pipe. Place a piece of cloth or burlap over the end of the pipe and drive the plug in place. Lower the tremie until the plug rests on the bottom, then fill the tremie pipe with concrete. When the tremie is raised the weight (mass) of the concrete will push out the plug. The plug can be salvaged by fastening a piece of wire to it before it is lowered into the water.

Further details for handling a tremie are found in Section 6-02.3(6)B of the *Standard Specifications*.

The thickness of seals without piling are generally not less than 0.43 times the height of high water above the bottom of seal. Seals in footing with piling require special design. The thickness of the seal is computed for the water elevation shown in the plans. The cofferdams must be designed and vented for this elevation. The design and vent elevations are noted in the plans. If concrete is placed in the seal during a period of high water, the dewatering of the cofferdam will have to be delayed until the water level drops to the vented elevation. No change in the vent elevation shown in the plans shall be allowed without approval from the State Construction Office. Such approval should be obtained before the cofferdam is designed. All cofferdams must be vented at the elevation used for computing the seal thickness in order to prevent an unsafe hydrostatic pressure on the seal. Cofferdams shall not be dewatered before the concrete has been placed and cured.

The vertical sheathing of the cofferdam or shoring shall extend below the bottom of the excavation in accordance with the approved working drawings. Sheet piles in cofferdams shall be placed tightly together so that there will be no flow of water through the cofferdams while seal concrete is being placed.

The tops of seals should slope slightly toward one end. At that end, provision shall be made for a sump for the pump intake. Cofferdams should be tightly constructed so that a minimum of pumping is required after the cofferdam has been dewatered. Space for water courses shall be provided on top of the seal and around the footing block, between the footing block and the walls of the cofferdam.

Before starting to place seal concrete, all equipment should be checked to see that it is in good working order. It is necessary that concrete in a seal be placed continuously until completion, with the end of the tremie always extending into the fresh concrete.

It is not desirable to leave cofferdam struts and waling in the seal concrete but it is sometimes necessary to do so, especially in soft foundation material, when a set of struts and waling is required near the bottom of the cofferdam. The concrete displaced by such struts and waling is not deducted from the Contractor's pay items.

After the cofferdam is dewatered, a film of scum or laitance will usually be found on top of the seal. This must be cleaned off before the footing concrete is placed. If the seal is designed as a footing, the laitance will have to be removed only from the areas that will support pier shafts, columns, or walls.

6-2.5 Pier, Column, and Wall Concrete

Concrete in all reinforced footings shall be placed in the dry. All reinforcing, including vertical wall or shaft bars and dowels, shall be securely fastened in place before placing of concrete begins. Driving of dowel bars into concrete must not be permitted, except in seal concrete when the seal is also the footing block, but they must be placed immediately after the concrete is placed. The placing and spacing of footing reinforcing steel is as important as in any other part of the structure.

Care must be exercised in placing reinforcing steel in the columns where it splices with the dowel bars into the footings. In many instances, if the dowel bars and column bars are not carefully placed, there is not enough space between the steel bars for proper placement of concrete. Considerable care must be taken in placing and vibrating the concrete in the columns so that no rock pockets are formed. Column details must be strictly adhered to since they are critical to the earthquake resistance of the bridge.

Care must be taken in placing and vibrating the concrete of sloping walls or columns to get proper consolidation and to avoid rock pockets.

Concrete shall be placed in one continuous operation from top of footing to bottom of pier cap or crossbeam unless construction joints are shown in the plans or preapproved by the State Construction Office. Concrete shall be placed at the

rate for which the formwork is designed. This rate, in feet of height (meters of height) per hour along with the concrete temperature, should be stated on the approved falsework plans. Spacing of studs, wales and form ties shall be as shown on the approved falsework plans. Rails, barriers, and parapets on retaining walls shall not be placed until all backfilling is completed. Vibrators shall be used at all times when placing concrete, unless otherwise specified.

6-2.6 Concrete Structures

6-2.6A Forms and Falsework

The forms for the structure shall be constructed in accordance with the approved falsework and form plans and the requirements of Section 6-02.3(17) of the *Standard Specifications*. In general, the forms used for all concrete surfaces which will be exposed, shall be faced with plywood. All plywood used shall be exterior type except where CDX is allowed by the specifications. All forms have to be strong enough to hold the plastic concrete in place until it has hardened. Forms should be designed to permit easy removal without damage to the concrete. Forms are a critical part of the concrete bridge construction process. Generally, the factor of safety used for design of forms is less than that of permanent construction. Therefore, it is extremely important that the forms are constructed in accordance with the approved form drawings. Any changes to the approved form drawings shall be reviewed and approved by the State Bridge and Structures Office.

The Contractor is responsible for designing and constructing the forms and falsework for fixed-form concrete. The Contractor must submit detailed plans (refer to Chapter 6-1.5 of this manual):

- For departmental approval;
- Except for footings and retaining walls less than 8 feet (2.4 meters) in height. See Section 6-02.3(16) of the *Standard Specifications*.

Prior to placing concrete, the Inspector should verify that all forms:

- Provide forming faces that are:
 - Smooth and firm;
 - Clean of dirt, laitance, oil, or any other material that would contaminate or discolor the concrete;
 - Treated with an approved form-release agent;
- Are mortar tight to avoid any leakage (including tape or caulking if needed for surfaces that will require Class 2 finish);
- Are constructed in accordance with the approved forming plans;
- Are adequately rigid and well supported to hold and retain the concrete without distortion or displacement;
- Are set at the locations, dimensions, lines, and grades as specified in the plans.

If wood forms are used, see that plywood is used for the form faces with:

- The joints and grain generally in line with the line of the structure.
- The face grain of the plywood running perpendicular to the supports.
- No offsets or projections that would leave an impression in the concrete surface.

Also verify that:

- Uniform chamfer strips are set at the correct line and grade as required for filleted edges.
- Adequate tie rods, snap-ties, hairpins, studs, walers, and braces are securely placed as needed support.

If metal or fiberglass forms are used, the same basic requirements apply, but particularly check for:

- Any dents or other defects that would harm the uniformity of the concrete surface.
- Any rust or other foreign material that would discolor the concrete surface.
- Countersunk bolts and rivet heads.
- Adequate support clamps, rods, and pins.

Prior to placing any reinforcing or concrete loads on the falsework, verify that:

- The bottom of the falsework is set on a solid foundation, with mudsills, minimum pile diameter, etc., all constructed per approved plans.
- The upper portion provides firm, uniform support.
- Devices such as screw-jacks and wedges are used to hold the forms at the correct elevation, and that they are free from defects, and undamaged or not bent.
- When wedges are used, they are placed in pairs to provide uniform bearing.
- The falsework construction is in accordance with the approved falsework plans and the *Standard Specifications*.

Major failures with loss of life have occurred as a result of poor falsework and formwork construction. It is critical that the Inspector check these temporary structural elements very carefully. Any deficiencies must be corrected before construction loads are applied. If there is a question, the State Bridge and Structures, Construction Support Engineer, or the State Construction Office should be contacted.

Suggested acceptance tolerances are as follows:

1. Bridges and similar structures:

- a. Variation from the plumb or the specified batter in the lines and surfaces of columns, piers, walls and abutments

Exposed, in 10 ft. (3 m)	½ in. (13 mm)
Backfilled, in 10 ft. (3 m)	1 in. (25 mm)

- b. Variation from the level or from the grades indicated on the drawings in slabs, beams, horizontal grooves, and railing offsets

Exposed, in 10 ft. (3 m)	½ in. (13 mm)
Backfilled, in 10 ft. (3 m)	1 in. (25 mm)

- c. Variation in cross-sectional dimensions of columns, piers, slabs, walls, beams, and similar parts

Minus	¼ in. (6 mm)
Plus	½ in. (13 mm)

- d. Variation in thickness of bridge slabs

Minus	⅛ in. (3 mm)
Plus	¼ in. (6 mm)

- e. Footings: Variation in dimensions in plan

Minus	½ in. (13 mm)
Plus	2 in. (50 mm)

- f. Misplacement or eccentricity

2 percent of the footing width in the direction of misplacement but not more than	2 in. (50 mm)
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- g. Reduction in thickness

Minus	5 percent of specified thickness
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- h. Variation in the sizes and locations

of slab and wall openings	½ in. (13 mm)
---------------------------	---------------

Forms for concrete surfaces which will be exposed shall be treated with a parting compound consisting of a chemical release agent. Form oil or other oils shall not be used. The parting compound shall be applied before the reinforcing steel is placed. The forms shall be thoroughly wetted on both sides in advance of placing the concrete.

The basic requirements for the removal of any forms and falsework are that:

- The curing temperature was above 50 F (10°C) during the cure period and that strength is adequate.
- No forms or falsework may be removed until authorized by the Engineer.
- All forms and falsework must be removed unless there is no access for removal (i.e., inside a box girder bridge).
- All forms and falsework must be removed in a manner that will not damage the structure.

Timing is a key consideration in the removal of forms and falsework. In terms of curing, the concrete, forms, and falsework must remain until the concrete has sufficient strength to support itself. For finishing purposes, it is generally better to remove the forms as early as possible to finish the surface while it is still green. Therefore, the timing of falsework and form removal depends largely on the type of structure as well as how it is cured and finished.

For example:

- Side forms — not load bearing — at least 24 hours for:
 - Footings, if curing compound applied to complete cure;
 - Steel or dense plywood if: (1) water reducer in mix; (2) low-slump mix, (3) 1,400 psi (9650 kPa) compressive strength, and (4) wet cure for balance of three days;
 - Otherwise three days minimum.
- Release of falsework — supporting weight (mass) of concrete (see *Standard Specifications*).

6-2.6B Traffic Barrier, Pedestrian Barrier, and Rail Bases

On some projects, the Contractor has the option of using slipform techniques in addition to the usual fixed forms as specified in Sections 6-02.3(6), 6-02.3(11)A, 6-02.3(24)C, 6-10.3(2), and 9-03.1(2)B of the *Standard Specifications*.

In either method, barriers and rail bases should be carefully aligned both horizontally and vertically to give a pleasing appearance; refer to Section 6-01.4 of the *Standard Specifications*. The vertical adjustment for the pleasing appearance is intended for localized camber and deck profile variables. This **adjustment is not intended to eliminate grade breaks, such as vertical curves and superelevation transitions**. The Project Engineer should plot to a large scale the profiles of the roadway grades at the curb lines. From these profiles, the grades for the tops of traffic barriers, pedestrian barriers, and rail bases can be properly determined. A slight hump in the barriers or rail base over the whole bridge is not usually objectionable.

On the safety-shape traffic barriers, some of the height variation may be accommodated in the vertical face at the base. Any height variation shall maintain the 2-foot 8-inch (815-millimeter) total height. The vertical toe face at the base is usually 3 inches (75-millimeters) unless the structure is receiving an immediate overlay. To accommodate the overlay, the vertical face at the base is increased to 3 inches (75-millimeters) plus overlay thickness. The front face geometry of the safety-shape traffic barrier is critical and should not be varied except as noted herein. Ideally, all height adjustment required to provide a pleasing appearance should be accomplished by modifying the total height of the traffic barrier by varying the vertical toe face at the base, i.e., 2-inch (50-millimeter) minimum. The front and back faces of the traffic barrier are parallel on the upper part to accommodate all height adjustment necessary. The 7-inch (175-millimeter) height of the intermediate sloping face shall be maintained. To ensure proper alignment, carefully check the top of forms or the Contractor's control wire prior to placing concrete.

On slipformed traffic barriers and pedestrian barriers, the same cross-section as shown for fixed-form construction shall be used, except the top chamfer may be shaped to a 3/4-inch (20-millimeter) radius. Although slipforming may be allowed in the contract, the reinforcing steel bars may not be sufficient to resist the forces during the concrete placement operations. The contractor should evaluate the stiffness of the reinforcing and, if necessary,

provide additional reinforcing steel crossbracing, both longitudinally and transversely. Slipformed concrete is usually placed with a slump of 1 1/4 inches (30-millimeters) plus or minus 1/4 inch (6-millimeters). This slump is critical and should be carefully controlled by the Contractor. It is not unusual to encounter conditions which produce sections of unsatisfactory barrier or rail base due to slump, finish, alignment or other problems. When this occurs, do not hesitate to have the unsatisfactory sections removed. Occasional removal is inherent in slipform construction.

Placement of the reinforcing steel bar cage to ensure adequate concrete cover and proper reinforcing bar location is very important and difficult to check for slipformed traffic barrier, pedestrian barrier, and rail bases. When fixed forms are used, final adjustment of the reinforcing steel bar cage can be accomplished after the forms are set prior to concrete placement. The slipform method does not present this opportunity. For that reason, Section 6-02.3(24)C of the *Standard Specifications* requires that the Contractor check reinforcing steel bar clearances and placement prior to slipform concrete placement. This check can be accomplished by either the use of an approved template or by operating the slipform machine over the entire length of the barrier. The final grade control must be set prior to the check. All reinforcing steel deficiencies must be corrected by the Contractor. Once the deficiencies are corrected, the Contractor may begin slipform concrete placement after he has the Project Engineer's approval.

6-2.6C Reinforcing Steel

For most concrete structures, some type of reinforcement is required to resist high tension stresses. Reinforcing materials include:

- Uncoated deformed steel bars, which are most commonly used.
- Other types, such as welded wire mesh, epoxy-coated bars, wire, prestressing cable.

(**Note:** Epoxy-coated bars require special handling to prevent damage to the coating.)

- Wire ties and other devices to securely hold the reinforcement in place.

The Contractor is responsible for determining and ordering quantities from the plans.

As reinforcing steel is delivered and stored at the project site, the Inspector should verify that:

- All positioning, spacing, sizes, lengths, shapes, and splice locations conform with the plans.
- Any field bending is done as specified and any cracked or split bars are rejected. If in doubt, reject the bar in question.

The Inspector should verify that the reinforcing placed is:

- Tied at all intersections if bar spacing is 1 foot (300-millimeters) or more.
- Tied at alternate intersections if spacing is less than 1 foot (300-millimeters).
- Supported in accordance with the *Standard Specifications*.

- **Tack welding is not allowed. It can severely damage the reinforcing steel.**
- Check that clearances between the forms and the reinforcement are within $\frac{1}{4}$ inch (6-millimeters) of those specified in the plans.
- Check that splices are located and constructed only as shown in the plans using either:
 - Lap splicing:
 - Not permitted for No. 14 or No. 18 bars.
 - Welded splices:
 - Special inspection is required (steel fabrication inspector).
 - Advance approval of welding procedures.
 - By certified welders (test welds).
 - Mechanical splicing (if allowed in the plans):
 - This type of splice must be approved by the State Materials Lab before use.
- Check that reinforcement is securely supported and held in place as follows:
 - By preapproved metal or plastic chairs, hangers, support wires, or mortar blocks that are at least as strong as the structure (mortar blocks require manufacturer certification or cubes for compressive strength testing).
 - With such supports having the correct dimensions to provide the required clearances.
- Check that all damaged epoxy-coated rebar is repaired in accordance with the *Standard Specifications*.

See the *Bar Identification Guide* (Figure 6-2) for proper identification of rebar at the job site.

The ASTM specifications for billet-steel, rail-steel, axle-steel, and low-alloy steel reinforcing bars (A 615M, A 616M, A 617M, and A 706M respectively) require identification marks to be rolled into the surface of one side of the bar to denote the producer's mill designation, bar size, type of steel and minimum yield designation. See Figure 6-2. Grade 60 (400) bars show these marks in the following order:

1st — Producing Mill (usually a letter)

2nd — Bar Size Number (#3 through #18)

3rd — Type Steel:

S for Billet meeting Supplemental Requirements S1 (A 615M)

N for New Billet (A 615M)

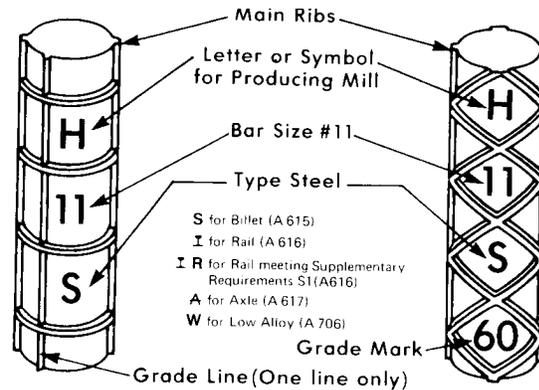
R for Rail meeting ASTM A 617M, Grade 60 bend test requirement (A 616M) [per ACI 318-83]

I for Rail (A 616M)

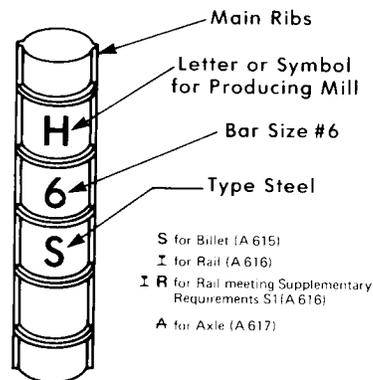
A for Axle (A 617M)

W for Low-Alloy (A 706M)

4th — Minimum Yield Designation



GRADE 60 (400)



GRADE 40 (300) AND 50 (350)

Figure 6-2

Minimum yield designation is used for Grade 60 (400) bars only and can either be one (1) single longitudinal line (grade line) or the number 60 (grade mark).

A grade line is smaller and between the two main ribs which are on opposite sides of all U.S. made bars. A grade line must be continued at least 5 deformation spaces. A grade mark is the 4th mark on a bar.

Grade 40 (300) and 50 (350) bars are required to have only the first three identification marks (no minimum yield designation).

Bar identification marks may be oriented as illustrated or rotated 90 degrees. Grade mark numbers may be placed within separate consecutive deformation spaces. Grade line may be placed on the side opposite the bar marks.

Reinforcing steel shall be placed in position as shown on the plans and held securely during the placement of the concrete. The strength of a reinforced concrete structure depends not only upon the amount of steel placed but also on its proper location. Improper location of the steel can impair the strength of the structure.

In instances where reinforcing steel is shown in detail in specific relationship to other material and details such as inserts, openings, etc., the Inspector should make sure that this relationship exists when inspecting the placement of the reinforcing steel. If the shown relationship is impossible to maintain or results in a conflict with other details, the State Construction Office shall be consulted to obtain clarification of the details.

The reinforcing steel shall be securely blocked from the forms by means of small mortar blocks, with a groove or tie wire embedded, not more than 2 inches (50-millimeters) square, or by other approved devices. If metal chair supports are used as supports for steel reinforcing bars, all surfaces of the chair supports not covered by at least ½-inch (13-millimeters) of concrete shall be treated in accordance with the requirements of Section 6-02.3(24)C of the *Standard Specifications*.

Runways for wheelbarrows or concrete buggies used in placing concrete shall not be supported on the steel reinforcing bars.

Steel delivered to the job far in advance of its use should be stored under cover to prevent rust. Mill scale is sometimes present on the reinforcing steel to such an extent that it must be removed. This is especially true with the larger bars. Removal can usually be accomplished by the use of wire brushes or by tapping the bars with hammers. Hardened concrete mortar must be removed from the reinforcing steel before placing the concrete. All reinforcing steel shall be in its proper place before concrete is placed. Driving of dowels, rail bars, etc., into concrete (wet setting) shall not be permitted. See the *Standard Specifications* for further details.

Before concrete is placed, the reinforcing steel shall be inspected to see that it conforms to the plans and that the steel is properly fastened in position. The amount of cover of concrete over the reinforcing steel in bridge roadway slabs and bridge approach slabs is critical. The Inspector must verify compliance with plan dimensions in the slabs by an adequate number of measurements of the steel reinforcing bar locations in the forms before and immediately after placing concrete. These measurements can be taken at the same time checks on the depth of the concrete in the slabs are taken. These measurements shall be recorded as to depth and location and made a part of the project construction documents.

When steel reinforcing bars protruding from columns or walls are exposed to weather for several months, they rust and exposed surfaces below become stained with rust. To prevent this, the bars should be protected to prevent rust. Coatings used for this purpose may prevent adequate bonding of concrete to the steel bars and should be removed from the bars before concrete is placed, except as allowed by the *Standard Specifications*.

6-2.6D Welding Reinforcing Steel

Reinforcing bars shall not be welded unless welding is indicated in the plans or special provisions. If welding is specified, the WSDOT welding inspector must be contacted for purposes of certifying welders and procedures. Reinforcing bars which are to be welded must be furnished of steel which is suitable for welding as specified.

Only operators qualified as specified in Section 6-02.3(24)E of the *Standard Specifications* shall be allowed to weld reinforcing steel.

AWS specifications require that Low Hydrogen type electrode (welding rod) be used for welding reinforcing steel. Generally, grade E7018 electrodes shall be used for grade 40 (300) reinforcing bars and grade E8018 electrodes shall be used for grade 60 (400) reinforcing bars. If semiautomatic welders are used equivalent grade electrodes shall be used. It is important that moisture be eliminated from the electrode and the steel reinforcing bars. The electrode must be prepared as called for in Section 6-03.3(25) of the *Standard Specifications*. To do this, a drying oven is essential and must be available and used at the site where welding is done.

The recommended procedure for welding steel reinforcing bars is given in Section 6-02.3(24)E of the *Standard Specifications*. The Contractor shall submit a welding procedure to the Engineer for approval. The Project Engineer shall transmit the Contractor's welding procedure to the State Bridge and Structures, Construction Support Engineer for review.

6-2.7 Prestressed Concrete Girders and Piles

Shop inspection of the manufacturing process of prestressed concrete products will be done by an inspector working under the direction of the State Materials Engineer. The State Materials Laboratory has instituted a procedure of inspecting each prestressed concrete plant in the State on an annual basis. During this inspection, the State Materials Laboratory obtains a list of the sources of the component parts to be used in manufacture of the prestressed concrete members. When the Contractor submits a request for approval of source of prestressed products, the complete member and the prestress plant which will manufacture it need only be listed.

The Inspector prepares a weekly Fabrication Progress Report and Inspectors Daily Report, and submits them to the Project Engineer for information and records. When the prestressed unit is completed, including finishing, the Inspector will attach an Approved for Shipment tag, and/or the girder will be stamped with an "approved for shipment" and a lab I.D. number. The Approved for Shipment tag properly signed and dated or the "approved for shipment" and a lab I.D. number will be the Project Engineer's basis for accepting the product at the job site. The Project Engineer will be required to inspect the item only for any damage which may occur during shipment or after the item arrives at the job site.

Finishing of concrete surfaces of prestressed units shall be in accordance with Sections 6-02.3(14) and 6-02.3(25)H of the *Standard Specifications* unless specifically changed by the special provisions. The Shop Inspector shall require that the finishing done in the shop is in accordance with the specifications.

Prestressed concrete girders shall be maintained in a plumb, upright position at all times and shall be lifted by means of the lifting strands provided at the ends of the girders. All prestressed girders have been designed for a vertical pickup at the ends as indicated in the contract plans, and any other method will induce stresses which could cause failure of the girder during pickup. Some deviation from the vertical is safe for some girders. If the Contractor wishes to deviate from the vertical pickup, they shall have the proposed method analyzed by their engineers and shall submit the method, with supporting calculations, for review. The Project Engineer submits the calculations to the State Construction Office for review. If the girders are broken or damaged during handling or erection, they will have to be replaced at the Contractor's expense.

The girders shall not be placed on the finished piers or abutments until the concrete in the piers or abutments has obtained at least 80 percent of its design strength. If grout pads are required, they shall be constructed and cured as required by the plans and specifications before placing the girders. If elastomeric bearing pads are required, the lower contact surface of the pads must be bonded to the structure with an approved rubber cement to hold them in the position shown in the plans.

The girders must meet the dimensional tolerances listed in Section 6-02.3(25)I of the *Standard Specifications*.

6-2.7A Shop Inspection of Prestressed Concrete Products

The Contractor is required to submit five sets of the shop detail plans to the Project Engineer for approval. The Project Engineer shall check these plans for compliance with the contract plans and specifications. The Project Engineer shall only approve the shop plans for standard series "I" girders and for the concrete piling shown in Standard Plan E-4 or E-4a. No deviations shall be approved without written approval of the State Bridge and Structures Engineer (or Terminal Design Engineer for Ferries Division projects). The shop drawings for all other precast piles or prestressed concrete products shall be approved by the State Bridge and Structures Engineer (or Terminal Design Engineer for Ferries Division projects).

The approved shop detail plans shall be distributed as follows:

A. Project Engineer (or Terminal Design Engineer) Approved:

2 sets retained by the Project Engineer (or Terminal Design Engineer)

1 set to the Contractor

2 sets, along with the contract plans and special provisions, to the State Materials Engineer

B. Bridge and Structures Engineer (or Terminal Design Engineer) Approved:

1 set retained by the Bridge and Structures Engineer (or Terminal Design Engineer)

4 sets to the Project Engineer, who will forward one set to the Contractor, and two sets to the State Materials Engineer who will forward the shop drawings and a set of contract plans and special provisions to the Prestressed Plant Inspector

Manufacture of these members shall not begin until the Contractor has received approval of the method, materials, and equipment they propose to use in the prestressing operations. Deviations from the approved shop drawings shall not be permitted unless approved in writing in advance of use.

Welding of the reinforcing bars will not be permitted unless shown in the contract plans.

The State Materials Lab has published a manual entitled "Inspectors Guide for Prestressed Plant Inspection and Quality Control" which contains more detailed instructions for this work.

6.2.7B Prestressed Girder Camber

Precast prestressed girders start creeping up immediately after prestressing strands are released in the casting bed. Over time, creeping or girder deflection upward continues. Bridge plans estimate the expected creep at 120 days, from prestress release to deck placement, and designate the letter "D" for this deflection. Theoretical girder camber at mid span vs. actual girder camber measured in field, after girder erection, should be compared for compliance with *Standard Specification* 6-02.3(25)k.

The camber diagram is a parabolic curve. In order to have a smooth vertical profile the pad dimension on top of girder flange varies through the length of span (see Figure 6-3). This dimension is usually least (depending on the vertical profile curve) at center span and maximum at center line of bearings which bridge plans refer to as "A" dimension. The designation "C" is the amount of camber added to the deck grade elevations to account for the anticipated downward girder deflection due to all superimposed loads (slab, overlay, sidewalks, utilities and traffic barriers).

Finished roadway grade elevations should be calculated along the center line of the prestressed girders at a minimum of every 10 feet for each span. Camber values at these locations need to be added to the finished roadway grade elevations to compensate for the girder deflection due to superimposed loads. Equation 6-1 calculates the camber at any point along the span.

$$Y = C - 4C(M - 0.5)^2 \quad (\text{Equation 6-1})$$

Y = camber at any point along the span length in inches (mm)

C = deflection due to superimposed dead load at span mid point in inches (mm)

M = location of span in decimal percent

The following example shows how tenth point span camber can be calculated.

Example:

Calculate camber at 0.20 point span for a prestress girder when girder length (ctr. - ctr. bearing) is 174.2 feet (53.085 m) and "C" dimension at mid span given as 3 inches (75 mm) (see Figure 6-4).

$$Y = 3 - 4(3)(0.20 - 0.5)^2$$

$$Y = 1.92 \text{ inches (48 mm)}$$

Once the girders are set in place and before any load is added to the girders, elevations are taken at the tenth point locations (or minimum spacing of 10 feet as determined by the span length) to be used to determine an adjusted "A" dimension. The adjusted "A" dimension is determined by subtracting the as built elevations from the calculated finished roadway grade elevations plus camber to determine the new adjusted "A" dimension at each location. The adjusted "A" dimension is used to string line between two adjacent points to determine soffit location.

6-2.8 Post-Tensioned Bridges

The construction of cast-in-place post-tensioned bridges requires considerable attention to details of construction by the Contractor and Inspectors. **The State Construction Office is available to present job-specific training on post-tensioned bridges.** They should be contacted after the post-tensioning shop drawings have been approved and before post-tensioning ducts and anchors are to be placed.

In addition to the falsework and form plans for the structure being approved by the Bridge and Structures Engineer, post-tension detail plans shall be submitted for approval as shown in the Shop Plans and Working Drawings Table in Chapter 1-2.4H of this manual. Included in these details will be the anchoring details, jacking forces, lift off forces, tendon profile, elongation of the tendons, and the tendon stressing sequence. In many structures, the dead load of the structure is increased at the jacking ends during the jacking operation. In these cases, the falsework at the jacking ends must be designed to carry the additional dead load.

The installation of the post-tension system begins with the placing of assemblies consisting of bearing plate, transition cone or trumpet and grout inlet. Duct sections consisting of rigid conduit are assembled with couplers and are tied to the stirrups. Anchorages and bearing plates are securely fastened to the forms to prevent movement and loss of mortar during concreting. Connections between trumpets and ducts, ducts and couplers, and ducts and vent saddles are taped with a durable and waterproof tape to prevent intrusion of mortar.

It is necessary that the ducts be located in the position shown in the approved post-tension details in order for the structure to function as designed. A misaligned duct will cause increased friction and localized stress which can result in failure of the member during the stressing operation. The Inspector must check to see that the ducts are properly located and securely fastened in place to prevent movement during concreting.

On continuous structures, vents must be placed at the high and low points of the tendon and grout inlets at the ends of the tendon.

At the completion of the duct installation and prior to placement of concrete in the top slab, a device of slightly smaller diameter than the inside diameter of the duct shall be blown through the ducts to ensure no undetected damage or blockage has occurred (see *Standard Specifications* Section 6-02.3(26)E).

The prestressing reinforcement strand is delivered to the site in sealed reel-less packs or reels containing desiccant to prevent corrosion. It is necessary that the prestressing reinforcement is free of rust and kept clean while it is assembled, stressed, and grouted. Normally, the grouting shall take place within 10 days of the time the strand is removed from the packs to prevent the accumulation of rust. The Inspector should check the reels of strand intended for use and reject those which show damage to the strand or visible rust. See Section 6-02.3(26)F of the *Standard Specifications* for further requirements.

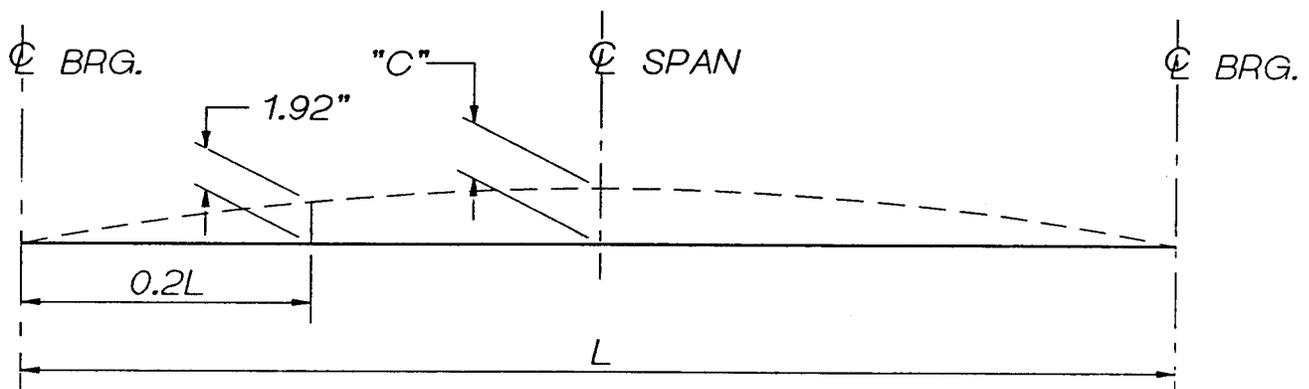


Figure 6-4

Some projects may be designed for the use of high strength steel rods instead of the strand. These rods come in various sizes to give the required steel area for the tendon in one bar instead of bundling several strands in the tendon.

Jacking operations shall not be started until the concrete in the structure has cured for the specified time or reached the specified strength. Jacking shall be carried out in the sequence shown on the approved post tension details to minimize the amount of eccentric loading on the structure.

During the jacking operations, no person should be directly behind either end of the tendon. Occasionally a tendon will let go, resulting in a very dangerous situation.

Each jack used to stress tendons shall be equipped with either a pressure gauge or a load cell along with certified calibration charts for determining the jacking force.

Gauging devices should be re-calibrated at intervals of not more than 180 days; however, if during the progress of the work, any gauging system appears to be giving erratic results, or if gauge readings and elongation measurements indicate materially different stresses, the jack and the gauges shall be re-calibrated.

A starting load, usually 20 percent of the jacking load, as shown in the approved post tensioning schedule, is applied to the tendon. The purpose of this starting load is to take up the slack in the tendon so that an accurate elongation measurement may be made. This load is applied by hydraulic jacks and measured by the jack gauges. During the stressing operation, the tendons shall be jacked to the specified load and the jacking load and elongation shall be recorded. Also the elongation after seating must be measured and recorded (see Figure 6-5).

In the event of discrepancies between measured elongations and calculated elongations (see Stress Acceptance Criteria), the entire operation should be carefully checked and the source of error determined and corrected before proceeding further. A discrepancy between the elongation and the jacking force usually indicates that the gauge on the jack is not correctly calibrated, there is undue friction between the duct and the tendon, or the tendons are not properly anchored.

Stress Acceptance Criteria

Strand Tendon (lengths 50 feet (15 meters) and less):

1. The tendon may be accepted provided: The measured elongation is equal to or exceeds 93 percent of the approved calculated elongation, and
2. A force verification lift-off is performed: The verification lift-off force is between -5 percent and +5 percent of the approved calculated force.

Strand Tendon (lengths greater than 50 feet (15 meters) and less than 150 feet (45 meters)):

1. If the measured elongation is between -7 percent and +7 percent of the approved calculated elongation, the tendon can be accepted.
2. If the measured elongation exceeds 107 percent of the approved calculated elongation, confirm the jack/gauge calibration, and then perform a force verification lift-off:

- a. If a force verification lift-off is performed on one end of the tendon only and the lift-off force is between -1 percent and +5 percent of the approved calculated force, the tendon can be accepted.

- b. If a force verification lift-off is performed on both ends of the tendon (jacking end and anchor end) and the lift-off forces are between -5 percent and +5 percent of the approved calculated force, the tendon can be accepted.

Strand Tendon (lengths 150 feet (45 meters) and greater):

1. If the measured elongation is between -7 percent and +7 percent of the approved calculated elongation, the tendon can be accepted.

2. If the measured elongation exceeds 107 percent of the approved calculated elongation, confirm the jack/gauge calibration, and then perform a force verification lift-off.

- a. If a force verification lift-off is performed on one end of the tendon only and the lift-off force is not less than 99 percent of the approved calculated force nor more than 0.7 $f_s A_s$, the tendon can be accepted.

- b. If a force verification lift-off is performed on both ends of the tendon (jacking end and anchor end) and the lift-off forces are not less than 95 percent of the approved calculated force nor more than 0.7 $f_s A_s$, the tendon can be accepted.

Singularly Jacked Four-Strand Transverse Deck Tendon:

The tendon may be accepted provided:

1. The measured elongation of an individual strand is between -10 percent and +10 percent of the approved calculated elongations, and
2. The average of all four individual strand percent elongations is between -7 percent and +7 percent of the calculated elongation.

Bar Tendon:

1. The tendon may be accepted provided: The measured elongation is equal to or exceeds 93 percent of the approved calculated elongation, and

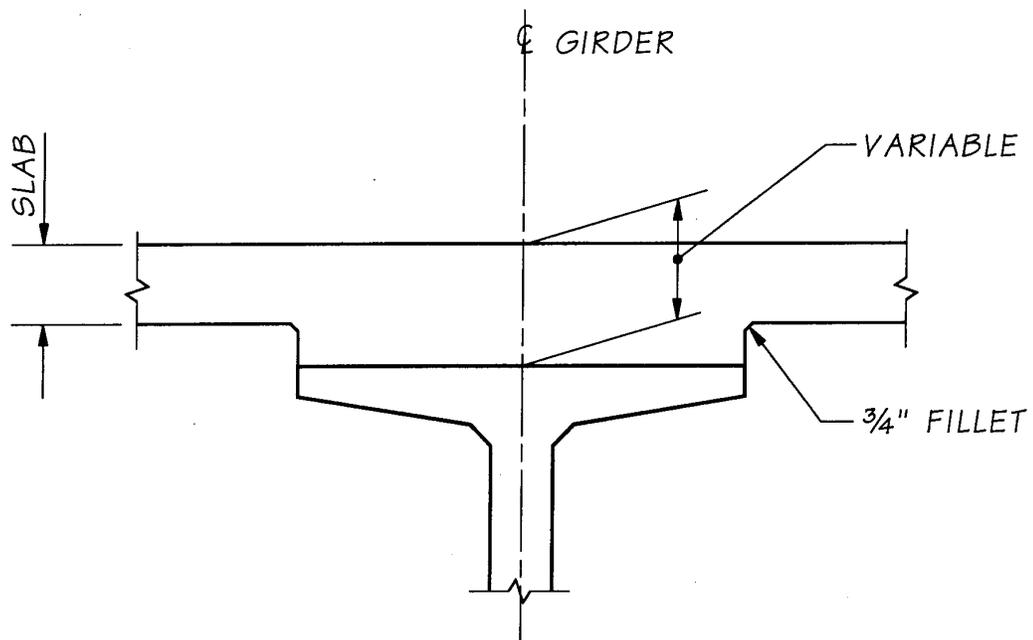
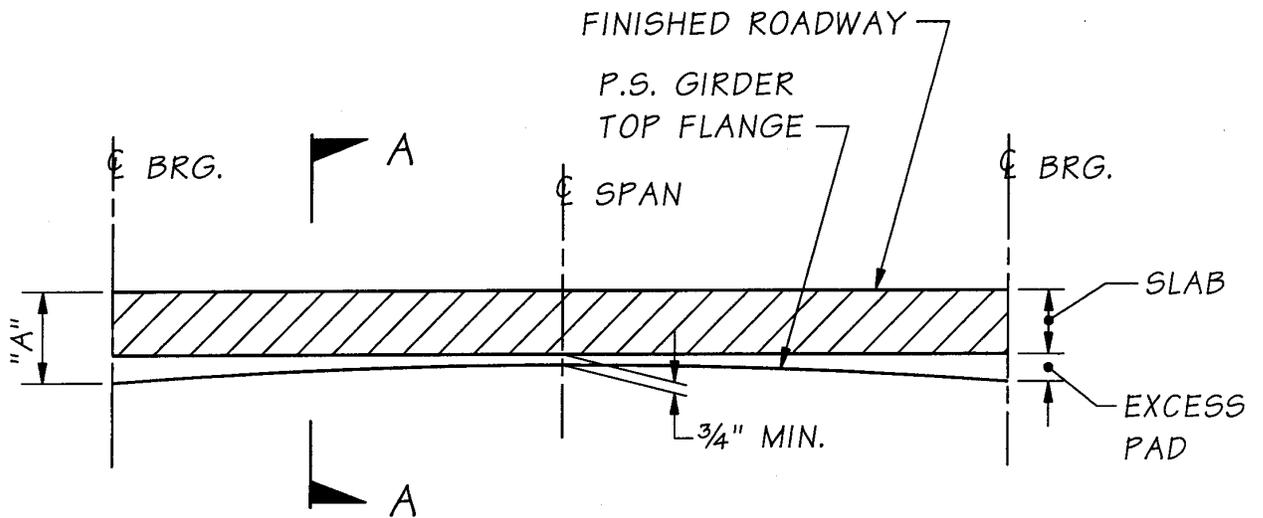
2. Perform a force verification lift-off: The verification lift-off force is between -5 percent and +5 percent of the approved calculated force.

If acceptance tolerances are exceeded, notify the State Construction Office.

f_s = specified minimum ultimate tensile strength of prestressing steel (270 ksi (1862 Mpa) for strands and 150 ksi (1034 Mpa) for bars.)

A_s = cross-section area of the tendon (0.153 square inches (99 square millimeters) for ½-inch (13-mm) diameter strand, 0.217 square inches (140 square millimeters) for 0.6-inch (15-mm) diameter strand.)

The grout used is fluid and quite different from the mortar we usually associate with the term grout. The component materials of the approved grout mix must be accurately measured. **The maximum amount of water specified must**



Section A-A
Figure 6-3

not be exceeded. The grout should be screened after it has been mixed and before it is added to the grout equipment to remove lumps which might cause clogging of the ducts.

Immediately, prior to grouting, the ducts shall be blown out with oil free compressed air. Grout is applied continuously by pumping under moderate pressure at the lower end of the duct toward an open vent at the upper end until all entrapped air is forced out the open vents. The open vents are closed under pressure of issuing grout after a steady solid stream of grout is discharging. The grouting pressure is gradually increased to a minimum of 100 psi (690 kPa) and 200 psi (1380 kPa) maximum and held at this pressure for a minimum of 10 seconds. The grouting entrance is then closed.

After grouting of the tendons, the recesses for the anchorages are cast solid with concrete.

A complete record must be kept of the stressing operations.

An example of the Post-Tensioning Record (Form 450-005) is shown in Figure 6-5 the following explanation to help in completing the record.

- A. Required jacking force for the tendon is obtained from the approved post-tensioning details.
- B. Gauge pressure is obtained from the certified calibration chart for the jack to obtain the required jacking force listed in "A" above.
- C. Gauge pressure for the initial force to take up the slack in the tendon and is usually 20 percent of the force obtained in "B" above.
- D. The designed elongation is obtained from the approved post-tensioning details, however the stress strain curves prepared by the steel manufacturer shall be used to determine the modulus of elasticity for adjusting the designed elongation based on the average value of all strands to be incorporated in the tendon.
- E. This required seating take up is obtained from the approved post-tensioning details. This is usually $\frac{1}{4}$ inch (6 millimeters) to $\frac{3}{8}$ inch (10 millimeters).
- F. & G. The elongation must be measured at the initial force of 20 percent of the required jacking force, at the specified jacking force, and again at the 20 percent loading.
- H. The difference in the elongation measured at full force and the elongation measured at the initial force of 20 percent (minus any dead end slip). This elongation should be reasonably close (see Stress Acceptance Criteria) to the required elongation in "D" above.
- I. Seating take-up is the difference in the elongation measured at full force and the elongation measured after the tendon has been seated and the jacking force reduced to the initial force of 20 percent of full force. However, since the elongations are measured at the end of the jack, the elongation of the tendon from the wedges to the measuring point must be accounted for to obtain the true seating take-up. After finding the difference between the full jacking force elongation and the 20 percent of full jacking force,

(11) the elongation of the tendon inside the jack must be subtracted from the difference to obtain the true seating take-up. (12) The elongation of the tendon inside the jack is approximately $\frac{1}{16}$ inch per foot (5 millimeters per meter). This seating take-up should be the same as the required take-up in "E" above. It is important that the specified seating take-up be obtained as it has an appreciable effect on the stress in the tendon.

J. Percent elongation per tendon is a comparison of the calculated elongation and the measured elongation. If the elongation obtained at full jacking force is not reasonably close to the required elongation, the following conditions are usually indicated:

1. There is more (or less) friction in the tendon than was anticipated in the calculations of the post-tension details.
2. The gauging devices on the jack are not properly calibrated.
3. The strands of a tendon are not properly anchored.

If tendon stressing is performed at an air temperature below 60 F (16°C), the Contractor should not be allowed to use jack pressure gauges that utilize oil or glycerin. This will ensure accurate jack pressure readings. The reason for this is that these gauges tend to react slowly at lower temperatures. What can happen with these gauges is the jack operator will bring jack up to the required gauge pressure and shut the jack off. Since the gauge is slow in reacting, it will continue to rise until it "catches" up, resulting in over stressing the tendon. Once this occurs, the tendon will usually need to be replaced.

6-2.9 Measurement and Payment

Measurement and payment instructions are covered in Sections 6-02.4 and 6-02.5 of the *Standard Specifications*.

6-3 Steel Structures

6-3.1 General

The Contractor shall submit shop plans of all steel fabrication for approval. Fabrication of the steel shall not be started until the shop plans have been approved by the Bridge and Structures Engineer (or Terminal Design Engineer for the Ferries Division projects) and the materials source and fabricator have been given approval by the State Materials Engineer. The State Materials Engineer shall advise the State Bridge and Structures Engineer (or Terminal Design Engineer) when the materials source or fabricator has been approved. The plans will not be returned to either the Contractor or the fabricator by the Project Engineer until the approval of source has been given by the State Materials Engineer. WSDOT approves the shop plans for sufficiency of the materials and connections and not for the correctness of dimensions. Some details of the design drawings may, with the approval of the State Bridge and Structures Engineer (or Terminal Design Engineer), be changed to suit the erection methods the Contractor desires to use. These revisions may require a change order.

The Contractor shall submit eight sets of all shop detail plans required for fabrication of the steel directly to the State Bridge and Structures Engineer and two sets to the Project Engineer. For the Ferries Division projects, all ten sets shall be submitted to the Terminal Design Engineer. If a railroad is involved, four additional sets are required for each railroad involved. See the shop plans and working drawings table in Chapter 1-2.4H. The Project Engineer should advise the State Bridge and Structures Engineer of any conditions that would affect the checking and approval of the drawings. These comments should be shown with a green color marker on the Project Engineer's copy.

Shop inspection is performed either by inspectors or representatives of the State Materials Laboratory. Material Acceptance Reports are obtained by these inspectors and provided to the Project Engineer upon completion of the shop fabrication. Erection plan sheets generally accompany the shop plans.

Falsework and erection plans for structural steel structures shall be submitted for approval in the same manner as for concrete structures.

Camber diagrams are normally shown in the contract plans. It is the Fabricator's responsibility to fabricate the members to the prescribed camber shown in the plans. The Fabrication Inspector should verify that the members are fabricated in accordance with the approved shop drawings.

The use of heavy equipment for erection purposes requires the approval of the State Bridge and Structures Engineer. See *Standard Specifications* Section 6-01.6.

Prior to completion of the project, the Contractor is required to furnish shop drawings on mylar or equivalent, which will be sent to the State Bridge and Structures Office for their permanent file. These drawings must be suitable for reproducing by microfilming.

6-3.2 Layout

Laying out work for structural steel spans requires greater accuracy than for other structures. Use precise instruments, standardized tapes, scales and thermometer when making layout. Spacing of piers, bents, and anchor bolts shall be as shown in the plans, providing the span after fabrication in the shop is the correct length.

The fabrication shop is required to furnish a sketch showing the length of span and amounts of camber measured in the shop at the time the spans are assembled. The Project Engineer should have a copy of this sketch before erection is begun. The lengths as measured in the shop seldom vary more than $\frac{1}{4}$ inch (6 mm) to $\frac{3}{8}$ inch (10 mm) from the design drawings, and there is sufficient play in the anchor bolt sleeves for this tolerance.

Allowance will be made on the design drawings for stretch of the span due to loss of camber. The Project Engineer shall compute camber elevations from the shop camber measurements taken by the shop. Elevations shall be set above the falsework at each panel point for the camber blocking. Most erectors set the camber blocks high to allow for settlement of the falsework. The amount of allowance for settlement should be decided by the erector. The Project

Engineer shall give the exact elevations for the finished camber. Elevations shall be given and carefully checked as an error means that an unnecessary amount of jacking and adjusting may be required.

The adjustment of spans is often a source of argument between erectors and engineers. Accurate work on the part of the Engineer will do much to avoid such arguments. Elevations set on the falsework before the load is applied may not be correct after the load is applied. It is the responsibility of the Contractor to determine the allowance that may be necessary to compensate for settlement in the falsework. It is easier to lower the span than to raise it.

6-3.3 Handling and Storing Material

Structural steel members shall be handled carefully to prevent twisting, bending, or scraping the member. The material shall be supported on suitable skids or platforms to keep it off the ground or out of water and it shall be protected from deterioration by rust.

Structural steel members should not be unloaded and stored on adjoining concrete approach spans. If the Contractor proposes to use the concrete approach spans to support the structural steel members, the proposal must be submitted in writing to the Bridge and Structures Office for review and approval. This proposal shall include drawings describing the support locations, loads, and supporting stress calculations. The structural steel members shall be placed on timber blocking, spaced so that the weight (mass) will be carried on the girders (load carrying members) and not on the comparatively thin concrete deck slab. Bridge decks are designed for carrying traffic and not as storage or dock space. This is especially true for concrete sidewalk slabs. Sidewalk concrete slabs shall not be overloaded by loads such as building material, tool sheds, or paint sheds.

6-3.4 Straightening Bent Material

Methods for straightening of plates, angles, other shapes, and built-up members shall not produce fracture or other injury to the metal, and shall be approved by the State Construction Office. Distorted members shall be straightened by mechanical means or by the carefully planned and supervised application of a limited amount of localized heat. The temperature of the heated area shall not exceed 1,100 F (593°C) (a dull red) and shall be controlled by temperature indicating crayons, liquids or bimetal thermometers.

Following the straightening of a bend or buckle, the surface of the metal shall be tested for evidence of fracture.

6-3.5 Setting Anchor Bolts and Masonry Plates

Anchor bolts are usually plain round bolts with the head and plate washer on the lower end and the thread and nut at the top end. These bolts are set in pipe sleeves to allow room for adjustment of the span. Location of anchor bolt sleeves is very critical and must be verified by the inspector. Also, the exposed length of anchor bolts should be checked to ensure enough thread is exposed out of the pier cap to tie down the lower bearing assembly.

Anchor bolt sleeves, when anchor bolts will not be grouted until after freezing weather, must be protected against damage from expanded ice by filling the sleeves with an approved nonevaporating antifreeze solution. Without exception, when piers and superstructures are constructed under separate contracts, the anchor bolt sleeves shall be filled with an approved nonevaporating antifreeze solution by the substructure Contractor. Before the bolts are grouted, the antifreeze solution shall be removed, the space well cleaned and the holes then filled with grout. The antifreeze solution shall be diluted with water and completely removed from the sleeves or it will have a detrimental effect on the filler grout. See Section 6-02.3(18) of the *Standard Specifications*.

It is important to set bearings level on all piers. Bridge plan bearing details usually show a leveling method. Bearings shall be set so that they are at zero movement at 64 F (18°C) after the total load is applied and the span is released. The amount of offset varies with the length of the span and the temperature at time of erection.

Anchor bolt holes and the void underneath masonry plates shall be grouted, after all structural steel is erected and adjusted for length and camber, and at least seven days before the deck concrete is placed. Portland cement shall be used for grouting and the procedure should be as outlined in Section 6-03.3(36) of the *Standard Specifications*.

Do not grout underneath masonry plates with dry mortar unless specifically shown in the plans. The Contractor shall build forms around the masonry plate about 4 inches (100 millimeters) high and pour grout in the form from one side until the whole area is well filled. Use a wire or steel band to keep the grout flowing. After the grout has taken its initial set, remove the form and cut the edges of the grout with a trowel to about a 45 degree bevel from the bottom of the shoe to top of the pier. Do not allow the finished grout to extend above the bottom of the masonry plate.

6-3.6 Erection of Steel

6-3.6A Assembling

Before erection of the steel is commenced, the structural steel members shall be inspected for damage during shipping and handling. Any members that have been damaged must be repaired or replaced before being erected.

All members should have been match-marked and shall be assembled in accordance with the erection drawings from the Contractor. As the erection progresses, the Inspector should compare assembled members against the erection plans to see that proper members are in correct positions.

If during assembling, it is discovered that various members do not fit together, do not allow undue force to be applied to make them fit. The application of such a force can introduce stresses in several components of the structure. These stresses can be of a magnitude high enough to cause serious structural problems. The structure has not been designed to take these stresses. In such cases, the Assistant State Construction Engineer, Bridges, shall be informed.

Structural steel members that are improperly fabricated, or do not fit, shall be rejected and either repaired or replaced with new. If the Contractor elects to repair the structural member, the proposed repair procedure shall be reviewed and approved by the Assistant State Construction Engineer, Bridges, prior to any repair work.

Unless otherwise shown or specified, structural steel connections shall be bolted. Simple truss spans shall be completely erected with all field-bolted connections and/or splices held in place with the minimum number of drift pins and bolts as specified in Section 6-03.3(32) of the *Standard Specifications*. Once the minimum number of drift pins and bolts are installed in all the connections, final adjustments for span length and camber shall be made prior to completion of bolting and release of falsework. The assembly and bolting sequence for all structural steel structures shall strictly follow the approved erection plan. Erection and bolting sequences, especially cantilever and arch spans, are usually detailed in the contract documents.

Field connections shall be pinned and bolted in accordance with the requirements of Section 6-03.3(32) of the *Standard Specifications*. This section applies to connections and splices made in the field. Connections are when one structural steel member is bolted directly to another structural steel member; such as, cross-members and braces. Splices utilize structural steel plates to connect two structural steel members; such as, a plate girder. It also requires all connections and splices be securely drift-pinned and bolted before the weight of the member can be released or the next member is added. The field erection drawings must specify pinning and bolting requirements. Section 6-03.3(32) then specifies the required minimum number of pins and bolts for field connections and splices.

All bolted connections are designed by WSDOT to be friction connections. A friction connection transfers the stress by friction between surfaces in contact and does not depend on shear or bearing between members and bolts. The friction is provided when the connection or splice members are compressed through tension on the bolts (measured by turn-of-nut or direct-tension-indicator method). To develop design contact surface friction, all bolts in a bolted connection must be properly tightened to the minimum specified tension. The *Standard Specifications* recognize that final design loads are not present during erection of the structural steel members. Therefore, during erection, all the bolts are not needed in order to develop the friction necessary in the connection or splice for erection loads. The *Standard Specifications* recognize this and require a minimum percentage of the holes to be filled during erection; for instance, 50 percent for normal structures and 75 percent for cantilevered structures. These holes are filled with a combination of drift pins and bolts. Drift pins are required to properly align the members since bolts are usually smaller in diameter than the holes. Bolts are required to develop the minimum friction required to transfer erection loading. The minimum friction or load-carrying capacity is not developed until the bolts are tightened to the specified minimum tension.

Once the member is released from its support (support falsework or crane), the *Standard Specifications* specify the procedure required to complete bolting of each connection.

Sometimes fabricators will temporarily bolt-splice plates to the appropriate member. The fabricator will usually use the minimal number of bolts to secure the splice plate during shipping and handling. These temporary bolts shall be removed and replaced with approved high-strength bolts.

6-3.6B High-Strength Bolts

Structural steel field connections are made with high tensile strength bolts conforming to the requirements of Section 9-06.5(3) of the *Standard Specifications* and Special Provisions. A special heat treatment gives these bolts a high tensile strength.

WSDOT designed bolted connections generally operate by a transfer of stresses by friction between surfaces in contact and do not depend on shear or bearing between the members and the bolts. Therefore, it is imperative that the contact surfaces of the metal shall be properly cleaned and the required minimum tension be obtained in the bolts.

The required tension in the bolts may be obtained by using either the Turn-of-Nut method or the Direct Tension Indicator (DTI) Method unless the specifications for the project state otherwise. If required because of bolt-entering and wrench-operation, tightening by either procedure may be done by turning the bolt while the nut is prevented from rotating. Section 6-03.3(33) requires a hardened washer under the turned element. Therefore, if the bolt is turned, a hardened washer is required under the bolt head. A hardened washer is also required with the DTI Method.

Bolted parts shall fit solidly together when assembled. Where an outer face of the bolted parts has a slope greater than 1:20, with respect to a plane normal to the bolt axis, a beveled washer shall be used to compensate for the lack of parallelism. See Figure 6-6. Bolts shall be tightened beginning from the center of each connection towards the edges of the connection. All joint surfaces, including those adjacent to the bolt heads, nuts or washers, shall be free of scale, except tight mill scale, and shall also be free of burrs, dirt, and other foreign material that would prevent solid seating of the parts.

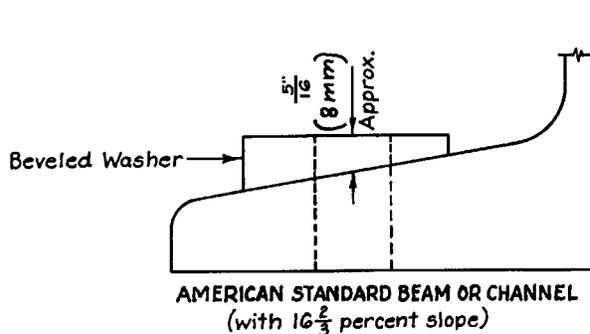


Figure 6-6

AASHTO specifications require that bolts bear specific identification marks. The following identification is marked on the top of the bolt heads:

	AASHTO M 164	AASHTO M 253
Type 1	A 325 8S	A 490 10S
Type 2	A 325 8S	A 490 10S
Type 3*	A 325 8S3	A 490 10S3

*At the manufacturer's option, Type 3 bolts may have additional distinguishing marks to indicate the bolt is atmospheric corrosion resistant and of weathering type.

Nuts of all classes, in nominal diameter M5 and larger, shall be marked with the property class designation (5, 9, 10, 12, 8S, 10S, 8S3, 10S3) on the top or bearing surface, on the top of flange, or on one of the wrenching flats. Additionally, nuts of Classes 10, 12, 8S, 8S3, 10S, and 10S3 shall be marked with a symbol to identify the manufacturer. For Classes 8S3 and 10S3 nuts, the manufacturer may add other distinguishing marks to indicate the nut is atmospheric corrosion resistant and of a weathering grade of steel.

Type 3 bolts must be used when the structure is not being painted (WSDOT rarely utilizes unpainted structural steel for new structures). Nuts and washers used with Type 3 bolts must also have weathering characteristics.

Each fastener shall be tightened to provide, when all fasteners in the joint are tight, at least the minimum tension shown in the *Standard Specifications* for the size and grade of fastener used.

Turn-of-Nut Method

When the turn-of-nut method is used to provide the specified bolt tension, all of the required minimum number of bolts within a bolted connection or splice shall be brought to a "snug tight" condition. The bolts shall be tightened to "snug tight" in a systematical order to ensure that all parts of the joint are brought into full contact with each other. This usually requires that the bolts located near the center of the connection or splice be tightened first. Then all remaining bolts shall be tightened from the center progressing toward the outer edges. "Snug tight" is defined as the tightness attained by (1) a few blows from an impact wrench, or (2) the full effort of a man using an ordinary spud wrench. The "snug tight" requirement also establishes the starting point for full tensioning by the turn-of-nut method.

Once the bolts are snug tight, the outer face of the nut and protruding part of each bolt shall be match-marked with crayon or paint. The match-marking provides the control to both ensure the bolt does not rotate during tightening and measure the nut rotation. The required minimum nut rotation is listed in Table 4 of Section 6-03.3(33) of the *Standard Specifications*. During this tightening operation, there shall be no rotation of the part not turned by the wrench.

Contractors often suggest a tightening method that eliminates marking the bolt as required in the turn-of-nut method. This suggested method requires calibration of the air impact wrench(es) and the inspection torque wrench. After calibration, the Contractor wants to snug tighten each bolt, then tighten to minimum tension using the air impact wrench without marking the nut and bolt. This method is heavily dependent upon the torque wrench test and is not accepted by WSDOT.

Direct Tension Indicator Method (DTI)

When the direct tension indicator method is used to provide the specified bolt tension, all of the required minimum number of bolts within a bolted connection or splice shall be brought to a “snug tight” condition. The bolts shall be tightened to “snug tight” in a systematic order to ensure that all parts of the joint are brought into full contact with each other. This usually requires that the bolts located near the center of the connection or splice be tightened first. Then all remaining bolts shall be tightened from the center progressing toward the outer edges. “Snug tight” is defined as the tightness attained by (1) a few blows from an impact wrench, or (2) the full effort of a man using an ordinary spud wrench.

This method uses a direct-tension-indicator washer that has formed protrusions on one face, leaving a gap. As the bolt is tensioned, the formed gap is reduced. The measurement of this gap verifies the bolt tension. Section 6-03.3(33) of the *Standard Specifications* addresses the maximum gap opening for direct tension indicators.

WSDOT has two concerns associated with the use of direct-tension-indicator washers. These concerns are (1) potential corrosion within the washer gap and (2) undetected bolt loosening as bolt tightening of a connection or splice proceeds. Following is a brief discussion of each item:

- (1) **Potential Corrosion:** The *Specifications* address this potential corrosion problem by limiting the maximum gap opening for painted and unpainted structures. These gap opening limits are governed by both tension requirement and required corrosion protection. The direct tension indicator manufacturers address only the minimum bolt tension requirement. It is, therefore, very important that the Inspector be aware of this additional concern of potential corrosion.
- (2) **Undetected Bolt Loosening:** The manufacturers of the direct-tension-indicator washers emphasize the ease and reliability of their product. They claim, and it is true, that if the gap is reduced to the specified maximum opening, the respective bolt is properly tensioned. The concern we have is that through the process of tightening all the bolts in a connection or splice, a warped plate may be progressively flattened, potentially loosening the initially tightened bolts. If this happens, the indicator washer still indicates the bolt(s) are fully tensioned. For this reason, WSDOT requires that bolt tension inspection, usually with a calibrated torque wrench, be performed. The Inspector should be aware of this potential problem and observe the tightening procedure with this in mind.

Inspection

The Inspector shall determine that the requirements of the *Standard Specifications* are met in the work. The Inspector shall observe the installation and tightening of bolts to determine that the selected tightening procedure is properly used and shall determine that all bolts are tightened and, in the case of the direct-tension-indicator method, that the correct indication of tension (gap) has been achieved. Bolts may reach tensions substantially higher than the value in Table 3 of the *Standard Specifications*, Section 6-03.3(33), but this is not cause for rejection.

The condition of the bolts is critical to the bolt-up operation and inspection. Bolts to be installed in the structure shall be lubricated in accordance with the *Standard Specifications*. A good check is a nut that is easily turned on the entire threaded portion of the bolt.

The following inspection procedure shall be observed for:

1. **Bolts tightened using the turn-of-nut method:** The Contractor, in the presence of the Engineer, shall use an inspection wrench which may be a torque wrench. Calibration of the inspection torque wrench is explained in a following section.

Bolts that have been tightened using the turn-of-nut method shall be inspected by applying, in the tightening direction, the inspecting wrench and its job-inspecting torque to 10 percent of the bolts, but not less than two bolts, selected at random in each connection. If no nut or bolt head is turned by this application of the job inspection torque, the connection shall be accepted as properly tightened. If any nut or bolt head is turned by the application of the job inspecting torque, this torque shall be applied to all bolts in the connection, and all bolts whose nut or head is turned by the job inspecting torque shall be tightened and reinspected. As an alternate, the Contractor may retighten all of the bolts in the connection, and then resubmit the connection for the specified inspection.

2. **Bolts tightened using the direct-tension-indicator method:** The Contractor, in the presence of the Engineer, shall use a feeler gauge to verify that each bolt has been properly tensioned to the maximum specified gap.

If a bolt that has had its direct-tension-indicator washer brought to full load loosens during the course of bolting the connection, the bolt shall have a new direct-tension-indicator washer installed and be retensioned. Reuse of the bolt and nut are subject to the provisions in the *Standard Specifications*.

Calibration of Inspection Torque Wrench

Five bolts of the same grade, size, and condition as those under inspection shall be placed individually in a calibration device capable of indicating bolt tension at least once each working day. There shall be a washer under the part turned in tightening each bolt. Each bolt shall be tightened in the calibration device by any convenient means to the specified minimum tension. The inspecting wrench then shall be applied to the tightened bolt and the torque necessary to turn the nut or head 5 degrees (approximately 1 inch (25 millimeters) at a 12-inch (300 millimeter) radius) in the tightening direction shall be determined. The job-inspection torque shall be taken as the average of three values, thus determined after rejecting the high and low values.

If the bolts to be installed are not long enough to fit in the state-furnished tension calibrator, five bolts of the same grade, size, and condition as those under inspection shall be tested using Direct-Tension-Indicator (DTI) to measure bolt tension. This tension measurement test shall be done at least once each inspection day. The DTI shall be placed under the bolt head. A washer shall be placed under the nut, which shall be the element turned during the performance of this tension measurement test. Each bolt shall be tightened by any convenient means to the specified minimum tension as indicated by the DTI. The inspecting wrench shall then be applied to the tightened bolt and the torque necessary to turn the nut 5 degrees (approximately 1 inch (25 millimeters) at a 12-inch (300 millimeter) radius) in the tightening direction shall be determined. The job-inspection torque shall be taken as the average of three values, thus determined after rejecting the high and low values.

Figure 6-7 shows the operator calibrating a hand-indicator torque wrench. The bolt is brought to the proper tension by either method described above. The dial on the wrench was set at “zero” and sufficient torque applied to rotate the nut 5 degrees in the tightening direction. At this point, the wrench dial shows the kips (kilonewtons) required to further rotate the nut or bolt head. The torque wrenches used by inspectors of both the Contractor and WSDOT should be tested and compared at the same time for purposes of uniformity.

6-3.6C Welding

Welding of structural steel shall be in accordance with the requirements in Section 6-03.3(25) of the *Standard Specifications*. Welding will not be accepted as a substitute for bolting and should be done only where indicated in the plans. Adding even small welds not shown in the plans can induce high stresses in the members. This could seriously impair the strength and structural capability of the structure involved. The structure has been designed assuming that no additional welding will be done. The approval of the Assistant State Construction Engineer, Bridges, is required before doing any welding not shown in the plans.

Good workmanship and proper materials are essential. Welding operators should be qualified for the type of welding they are required to do. Welding procedures shall be approved by the Bridge Engineer before starting to weld on the structure.

Welding defects should be corrected as indicated in the *Standard Specifications*.

Low hydrogen type electrodes must be dry when used. The care and use of these electrodes as given in the *Standard Specifications* should be completely observed. No relaxation of these requirements can be tolerated.

6-3.7 Placing Concrete Roadway Slab

As required in Section 6-03.3(39) of the *Standard Specifications*, the masonry plates shall be grouted and steel work, except railing, completely bolted and released from the falsework before forming for the roadway slab begins. Expansion dams shall not be bolted down until after the span is released from the falsework.

The camber diagram shown in the plans, especially for welded steel plate girders, quantifies the calculated deflection of the steel girder weight and the deflection of the girders due to the concrete slab weight (mass). The camber diagram for the weight (mass) of the steel girders only is utilized by the girder fabricator.

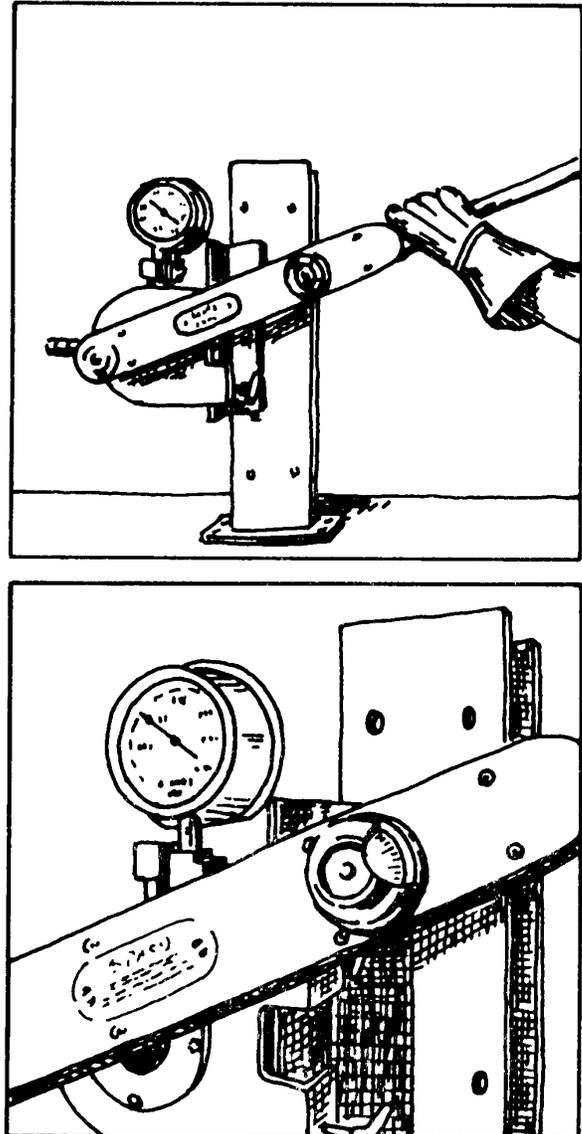


Figure 6-7

Once all the temporary girder supports are removed, it is important that elevation control points on the top of the flanges of the girders or floor beams be established and permanently marked before any external load, such as form lumber, reinforcing steel, etc., is applied. These control points should be located at proper intervals to establish elevations for formwork and finished roadway slab grades. These control points should be at the span tenth points or at cross-frame locations (panel points).

Once these control point elevations are established, fills at each of these control points shall be calculated utilizing the camber diagram for the weight (mass) of the roadway slab and the profile grade. These control point fill values shall be used from that point on because it is extremely difficult, if not impossible, to calculate the deflection of the girders as formwork and reinforcing steel are added. These control point fill values will be used for the final adjustment of the roadway slab finish machine.

A pouring sequence for the roadway slab may be shown in the plans to reduce the size of the concrete pours, control deflection, and minimize tension cracking of the concrete slab during construction. Placing and finishing the concrete in the roadway slab shall be the same as for Concrete Structures covered in Chapter 6-2 of this manual.

6-3.8 Railings

Steel railings may be erected in place at the same time the trusses are erected but they shall not be finally aligned or bolted until after the concrete deck is placed. Railings shall be true to line, and for single spans shall show the camber of the span. For two or more spans the railing shall show a uniform camber over all of the spans; that is, the individual camber of each span shall not be carried in the railing.

6-3.9 Painting

Steel structures shall be painted in accordance with the requirements in Section 6-07 of the *Standard Specifications*.

6-3.10 Measurement and Payment

Measurement and payment instructions are covered in Sections 6-03.4 and 6-03.5 of the *Standard Specifications*.

6-4 Timber Structures

6-4.1 General

Framing plans and details for treated timber structures shall be furnished by the Contractor and approved by the Project Engineer. Upon approval of the framing details, one set shall be returned to the Contractor and one set furnished to the shop inspector. Inspection of shop framing and treating of timber is performed by shop inspectors of the Materials Lab. Inspection reports showing details of treatment and lists of materials shipped will be mailed to the Project Engineer. Representative pieces of each shipment will be stamped by the shop inspector.

Untreated timber may be accepted on the basis of an inspection certificate in accordance with Section 9-09.2(3) of the *Standard Specifications*.

6-4.2 Storage and Handling

Timber and lumber shall be stored off the ground and piled to shed water and prevent warping. Treated timber shall be handled carefully to prevent breaking of the outer fibers and rope or chain slings shall be used. Pike poles and peaveys are not to be used in handling treated timber.

6-4.3 Framing

All cutting, framing and boring of treated timbers shall be done before treatment insofar as is practicable. Framing shall be done in accordance with the requirements of Section 6-04.3 of the *Standard Specifications*.

6-4.4 Field Treatment of Timber

When field framing cannot be avoided, the cuts and holes shall be treated as required in the *Standard Specifications*. Timber for field treatment must be dry before applying the required treatment. Holes shall be bored for all bolts, drift bolts, boat spikes, dowels and truss rods using augers of the size specified in Section 6-04.3(5) of the *Standard Specifications*.

After removal of temporary scaffolding and formwork, the nail and bolt holes in treated timber shall be repaired in accordance with the *Standard Specifications*.

Field treatment for structures of untreated timber shall be in accordance with the requirements in Section 6-04.3(4) of the *Standard Specifications*.

6-4.5 Painting

Painting of timber structures shall be in accordance with the requirements in Section 6-07 of the *Standard Specifications*.

6-4.6 Measurement and Payment

Measurement and payment instructions are covered in Sections 6-04.4 and 6-04.5 of the *Standard Specifications*.

6-5 Piling

6-5.1 General

Piling shall conform to the requirements of Section 9-10 of the *Standard Specifications*. When piling is received on the project, it shall be inspected and a notation made in the section of Miscellaneous Notes in the Pile Record book. Untreated timber piles will be inspected in the field and accepted for use there. All other piling, except concrete piles cast on the job, will be inspected by Fabrication Inspectors before delivery.

6-5.2 Treated Timber Piling

Chain slings will be permitted in handling treated timber piles. Treated timber piling shall be furnished and driven full length, i.e., without splices. The entire length shall be pressure treated. Therefore, the pile tip shall not be cut after treatment. If splices become necessary and the order length furnished by the Engineer is insufficient, the State Construction Office should be contacted for direction. However a splice probably will not be considered if it cannot be located below the permanent water table elevation.

6-5.3 Precast Concrete Piling

Curing beds for steam cured concrete piles shall not rest directly on the floor but shall be elevated enough to permit the complete circulation of steam around the piles.

Lifting loops shall be removed to ½ inch (15 millimeters) below the surface of the concrete and the hole filled with mortar.

Concrete piles shall be handled as described in the *Standard Specifications*, the *Standard Plans*, or as shown in the plans in order to avoid excessive deflections and strains.

6-5.4 Cast-in-Place Concrete Piling

The casings for piles cast in place shall be carefully checked after driving, for water tightness and deformation of the casing due to the driving of adjacent piles. A mirror for reflecting light into the casing is the most common method for this check. On cloudy days, a flashlight may be lowered into the casing.

Immediately after driving, the pile casing shall be covered to prevent dirt and water falling into it. All debris and water shall be removed from the casing prior to placing the reinforcing steel cage. No water will be permitted in the casing when concrete is placed.

Due to the ever increasing loading from earthquake activity, most cast in place piling require reinforcement for the full depth of the pile. This full depth reinforcement presents extreme difficulty in placing concrete with a rigid conduit the full depth, especially if the pile is battered. For this reason, Class 4000P (28P) concrete is required. This class of concrete has small aggregate and fly ash making the mix rather sticky and cohesive, which reduces the likelihood of segregation during placement. This concrete shall be placed continuously through at 5-foot (1.5-meter) rigid conduit directing the concrete down the center of the pile casing, ensuring that every part of the pile is filled and the concrete is worked around the reinforcement. The top 5 feet (1.5 meters) of concrete shall be placed with the tip of the conduit below the top of fresh concrete. The Contractor shall vibrate, as a minimum, the top 10 feet (3 meters) of concrete. In all cases, the concrete shall be vibrated to a point at least 5 feet (1.5 meters) below the original ground line.

No Engineer's order list will be given for cast-in-place concrete piling.

6-5.5 Vacant

6-5.6 Steel Piling

Steel piling shall be handled in such manner as to prevent bending of the flanges, and when stacked they shall be supported in such a manner that the piles will not bend. When steel piles must be spliced and splicing details are not shown in the plans, the splice should be made with a single V-butt weld over the whole cross-sectional area of the pile. Welding shall be done with specified welding rod and suitable equipment in accordance with American Welding Society Specifications and good industry practice. A qualified welder is required. See Section 6-05.3(6) of the *Standard Specifications*.

No Engineer's order list will be given for steel piling.

6-5.7 Pile Driving

6-5.7A General

It is suggested that the State Construction Office be contacted before any piling are driven.

Piling shall be driven to develop the bearing value as shown in the plans or in the *Standard Specifications*. The penetration of the piles under the last few blows must be carefully gauged and the bearing value computed by use of the formula shown in the *Standard Specifications*. Pile driving specifications should be administered with a great deal of common sense. There is no substitute for experience and good judgment.

Often the foundation reports contain two pile tip elevations, "estimated tip" and "minimum tip" elevations. The estimated tip elevation is simply the elevation that the tip is estimated to be driven to and is utilized to determine driving length quantities in the bid item for furnishing piling. Minimum tip elevations are often specified in the contract plans. These are usually to ensure that piles do not hang up on logs, a thin hard soil layer and other obstructions, or to achieve a minimum pile penetration (e.g., uplift and/or lateral load capacity). Minimum tip elevations are also specified where resistance to uplift is taken into consideration in the design of the foundation seal thickness. The minimum tip elevations should be higher than the estimated tip elevations. The Project Engineer should always review the tip elevations in the plans and compare them to the foundation report recommendations. Any discrepancies should be reported to the State Construction Office.

The minimum tip elevations is a design parameter that may come from the geotechnical design or the structural design. A pile tip elevation that is less than minimum cannot be accepted in the field, it must be reviewed by the State Bridge and Structures Office, the State Bridge Construction Office, and the State Geotechnical Engineer. If, during the initial pile driving operations, minimum tip is not being achieved, no additional piling should be driven until concurrence is obtained to change the minimum tip elevation, or the contractor will have to change his method of installation so that the minimum tip elevation can be achieved.

Where the specified minimum tip elevations cannot be reached the State Construction Office shall be notified.

Foundation piles must be driven true to line and in their proper position so that full bearing and lateral support is secured for each pile. Each pile has been definitively positioned in the design, and piles should be driven as nearly as practicable to the position shown. Any variation of 6 inches (150 millimeters) or more from the plan shall be reported to the State Construction Office before accepting the pile. The tolerance for all types of battered piles is ¼ inch in 12 inches (20 millimeters in 1 meter). Any deviation exceeding this tolerance shall be reported to the State Construction Office for evaluation.

Pile driving leads shall be fixed at the top and bottom as discussed in Section 6-05.3(9)C of the *Standard Specifications*, to ensure that the piling can be accurately driven both as to position and batter.

The type and size of hammers to be used to drive piling are specified in Section 6-05.3(9)B of the *Standard Specifications*. The Project Engineer shall require the Contractor to furnish full information on any hammer proposed for use so it can be determined whether or not the hammer meets the requirements of the specifications and that the bearing capacity of driven piles may be computed. It is very important to verify that the drop of the ram is in accordance with the submitted data. Otherwise, the pile bearing calculations will not be correct. A useful formula to determine the drop of a single acting diesel hammer determined from measuring the blows per minute is:

Stroke Formula (ft. of drop) = $4.01((60/\text{BPM})^2) - 0.3$

Stroke Formula (meter of drop) = $((4.01(60/\text{BPM})^2) - 3) * .3048$

Where BPM is the blows per minute of the hammer.

This drop can then be used in the bearing equation in the *Standard Specifications* to determine the bearing of the piling.

This formula calculates the drop from the rate of blows per minute that the hammer is hitting at and makes it no longer necessary to watch the top of the hammer and estimate the distance that hammer is coming out of the casing. Since the rate the hammer runs at is dependent on the drop of the hammer, and this hammer drop is accelerated at a constant by gravity, the distance the ram travels can be determined from the formula.

The *Standard Specifications*, Section 6-05.3(9)B, and Special Provisions, govern the hammer size by specifying the minimum ram weight (mass) and the minimum energy required for each type of pile, required bearing, and hammer. The most commonly used hammers are air, hydraulic, or diesel activated. The hammer energy output is simply the weight (mass) of the ram times the distance the ram falls. This energy determination is a simple matter with a drop, hydraulic, or air/steam activated hammer. The measurement of the energy output of a diesel activated hammer is more complex. The minimum energy required by the specifications is the energy output of the hammer at the point of impact at the required pile bearing. The hammer needs to operate at or above the required minimum energy level in order to achieve the specified pile bearing capacity.

The Project Engineer may approve the Contractor's proposed hammer if it meets the criteria of the *Standard Specifications* and the special provisions. During field operations, the pile driving hammer must be capable of delivering at least the required minimum energy at the required pile bearing value. The State Construction Office should be consulted for any unusual hammer submittals or insufficient performance in the field.

Drop hammers, which are rarely used, must be weighed before any piles are driven. The drop hammer stroke should be carefully measured. This can be done by taping a piece of rope or rag around the hammer line at the height above the hammer for the drop desired. The hammer operator can then gauge the drop with reasonable accuracy. The stroke (drop) of the hammer ram must be consistent with the required minimum energy.

Air or steam activated hammers lift the ram by either air or steam pressure to a predetermined distance and release the ram. The energy is produced by the falling ram. These hammers usually operate at 50 to 60 blows per minute depending on the hammer manufacturer. A count of the actual blows per minute will provide verification that the hammer is operating properly. If the blows per minute exceed the published manufacturer's data sheet for the specified minimum energy, and the Contractor is not able to find and rectify the problem, the State Construction Office shall be notified. No additional piling are to be driven until the problem is resolved.

Hydraulic activated hammers lift the ram by hydraulic fluid pressure to a predetermined distance and then release the ram. The energy is produced by the falling ram. There are two types of hydraulic activated hammers, single and double acting. The hydraulic activating systems for both of these types of hammers are totally enclosed using a vegetable oil medium, rendering them environmentally friendly. The method for measuring the energy output is different for each type of hydraulic activated hammer. The energy output for each type can be varied by using simple adjustment procedures. Again, the respective hammer must be operating at or above the specific minimum energy when the required pile bearing capacity is reached.

Diesel activated hammers lift the ram by energy produced when diesel fuel is ignited. The energy produced is a combination of the fuel explosion and the drop of the ram. There are two types of diesel activated hammers, single and double acting. The method for measuring the energy output is different for each type of diesel activated hammer. Diesel hammers produce a variable energy. The variable energy output of a diesel hammer is dependent on a number of factors, which include fuel quality, fuel setting, soil conditions, and resistance from the pile being driven. As the pile resistance increases, the energy output of a diesel hammer usually increases. The manufacturer's maximum energy value for each diesel hammer is measured in the laboratory using a hammer in tip top shape. For this reason, it is a good idea to have a hammer on the project with a maximum rated energy higher than the contract minimum required energy. A good rule of thumb when selecting a diesel hammer is that, if 80 percent of the maximum energy of a hammer equals the contract minimum required energy, the diesel hammer will produce sufficient energy to meet the contract energy requirements.

A single acting diesel activated hammer is open at the top, and at the top of the ram stroke a portion of the ram is usually visible. The bearing value of the pile being driven is determined by the number of blows per foot (300 millimeters) at a blows per minute rate. The energy output of a single acting diesel hammer is determined by the blows per minute of the running hammer. The manufacturer is required to submit this energy data. The rate (blows per minute) is dependent on how high the ram raises up (stroke) due to the diesel fuel combustion. Thus, the longer the stroke, the greater the energy and the longer it takes. In other words, as the rate (blows per minute) decreases, the energy output increases.

A double acting diesel activated hammer is closed at the top. This closed top acts as a pressure chamber driving the ram back down where the diesel fuel explosion occurs. The bearing value of the pile being driven is determined by the number of blows per foot (300 millimeters) at a measured pressure within the top bounce chamber. The energy output of a double acting diesel hammer is determined by the measured bounce chamber pressure while the hammer is operating. The manufacturer is required to submit this energy data. Each double acting diesel hammer comes with a hose running from the bounce chamber to a box containing a pressure gauge. There is usually a button on this pressure gauge box. When the button is depressed the gauge is activated with the bounce chamber pressure. If this button is depressed continuously, the hammer efficiency decreases because of the pressure bleed off created by the pressure gauge operation. The button should only be depressed periodically when an energy reading is required. The pressure reading and corresponding energy shall meet the minimum energy at the required pile bearing value.

On some projects, pile driving vibrations will be monitored for potential damage to adjacent structures or buildings. When that monitoring indicates a potential for damage, the Project Engineer should ensure that the minimum size hammer specified for the piling being driven is actually being used. If so, and vibrations are still potentially damaging, the State Construction Office should be notified to determine if preboring or jetting should be used to reduce vibrations. Should preboring or jetting, or other methods be determined necessary, such work shall be considered a change in accordance with Section 1-04.4 of the *Standard Specifications*.

The contract allows the use of vibratory hammers to initially set piles. As of yet, there is no reliable means of determining the actual bearing capacity of a pile driven by a vibratory hammer. Often, the contractor wants to initially set piles with vibratory hammers if the soils and/or limited access are such that impact hammer operation would be difficult. The contract allows this but requires that an impact hammer be used to acquire the bearing capacity. Since static friction is usually much higher than dynamic friction, the actual bearing capacity is determined while the pile is in motion. This requirement is governed by the contract requirement that the pile must be driven at least an additional 2 feet (0.6 meters) using an impact hammer with the blow count (blows per inch (25 millimeters)) constant or increasing. If the contractor uses a vibratory hammer to initially set the piles, there must be a comprehensive procedure to ensure proper location and plumbness of each pile. This is usually accomplished by providing a rigid steel template and using good conscientious control while setting and initially driving each pile.

The use of water jets may be required for driving piles, especially for concrete piles. The piles must be driven at least 6 inches (150 millimeters) after the jet is removed, or to the required bearing. Do not allow the nozzle of the jet to penetrate below the tip of piling previously driven. Mark the jet pipe in such manner that the operator and Inspector can determine the depth required. The State Construction Office should be notified if water jets are proposed for use.

Preboring may also be used to secure the minimum specified penetration. Usually the prebored hole should be slightly smaller in diameter than the pile and the depth of preboring should be less than the minimum specified penetration. However, conditions may exist which make it necessary that a larger hole be prebored and the space around the pile be filled with sand while the pile is being driven to the specified bearing. Unless water-jetting, preboring, or other means of securing minimum penetration is specified and payment is provided for in the contract provisions, this work will be at the Contractor's choice and expense. However, the procedure used must be approved by the Engineer and shall result in a satisfactory pile and will not damage the integrity of the structure, roadway, adjacent structures, or utilities. Any damage done must be repaired to the satisfaction of the Engineer at the Contractor's expense.

The lengths of piling required are determined by driving test piles or by other information which may be available. The Project Engineer provides the Contractor with an order list for timber and precast concrete piles. This list must show the length of piles required below cutoff (the top of the pile within the footing). The Contractor should be informed that the lengths shown on the order list should be increased, at their expense, the necessary amount to provide for fresh heading and to reach from the cutoff elevation up to the position of the driving equipment. Payment for piling will be made for the number of feet shown on the order lists except that if greater lengths are driven, with the approval of the Project Engineer, payment will be made for the lengths actually driven below cutoff. Itemized lists for cast-in-place piles or steel piles will not be furnished by the Engineer.

Rejected piles shall be removed or cut off 2 feet (0.6 meter) below the bottom of the footing. Rejected casings for cast in place piles that are left in place shall be filled with sand.

The handling and driving of treated piling require special care. Heads of piles should always be freshly cut, and rings or wire mesh screens placed on top during driving. In wet weather the final cutoff should be at least 1 foot (0.3 meter) long and the creosote, pitch and fabric cover placed immediately after the pile is cut. Do not make a cutoff and then wait until the next day to place the cover. Fabric covers should be well tacked to the pile and neatly trimmed to within 3 inches (75 millimeters) of the top of the pile so that the fabric will not have ragged edges. A follower driving cap should be used on treated piles. This is to help hold the pile in line to minimize the use of chocks in the leads during driving. Timber piles must be strapped in accordance with the requirements of Section 9-10.1 of the *Standard Specifications* before they are driven.

Precast concrete piles require special care in storage and handling, especially when raising them into the leads. The general method of attaching slings for handling is described in the *Standard Specifications*. Long piles must be supported at the ends and at intermediate points to prevent undue bending and cracking of the concrete. In special cases the plans may show the method for lifting long piles. Some pile driving crews lack experience with concrete piles and handle them as they are accustomed to doing with timber piles. Such handling will probably result in damage to the concrete piles and must not be allowed.

In driving precast concrete piles, several layers of plywood or a 3½-inch (90 millimeter) wood block should be placed between the top of the pile and the steel driving head of the hammer. Care should be taken to prevent crushing of the pile head before the desired penetration is reached. Where crushing occurs, the top of the pile should be checked to determine if the end is square with the body of the pile; also, the hammer should be checked to determine if a fairly flat blow is being delivered to the pile. In driving concrete piles, it may be advisable, in order to prevent crushing of the head and to obtain the required penetration, to operate a hammer at less than full throttle until just before completing the driving, after which the throttle should be fully opened in order to obtain the true bearing value of the pile.

Large diameter prestressed concrete cylinder piles are not completely covered in the *Standard Specifications*. The requirements of the special provisions must be observed. Accuracy of placing and driving is most important. Every effort should be made to prevent these piles from drifting out of line or out of plumb during driving, but care must be taken to avoid applying excessive lateral force which may crack the pile. These piles do not have to be very far out of plumb before excessive overstress occurs. When a driven pile is found to be cracked or is out of plumb, it should be referred to the State Construction Office for a decision regarding corrective action to be taken.

Care shall be taken in driving steel H piles to ensure that the driven pile is oriented as close as possible to that shown in the plans. Pile design usually involves horizontal forces due to temperature, concrete shrinkage, earthquake, and wind as well as axial forces, and if a driven pile is not aligned as shown in the plans, the pile may become overstressed due to excessive bending stresses. Any deviation of more than 20 degrees from the pile axis or more than 6 inches (150 millimeters) from the position shown in the plans shall be reported to the State Construction Office for evaluation and acceptance.

6-5.7B Test Piles

A careful study should be made of the foundation exploration data shown in the plans and/or included in the Geotechnical Report before driving any test piles. Care should be taken that the test piles are not stopped on a relatively thin hard layer overlying softer material. After the test piles have been driven, an effort should be made to correlate the results with the foundation data before ordering the permanent piles. The results from driving the test piles should be discussed with the Regional Operations/Construction Engineer if they do not correlate with the foundation data.

Test piles shall be driven to at least 15 percent more than the ultimate bearing capacity required for the permanent piles, except where pile driving criteria is determined by the wave equation. When pile driving criteria is specified to be determined by the wave equation, the test piles shall be driven to the same ultimate bearing capacity as the production piles. Test piles shall penetrate at least to any minimum tip elevation specified in the Contract. If no minimum tip elevation is specified, test piles shall extend at least 10 feet (3 meters) below the bottom of the concrete footing or groundline, and 16 feet (5 meters) below the bottom of the concrete seal.

Preboring, jetting, or other approved means may be used to secure minimum penetration with the test pile if such means is necessary and will be used for the permanent piles. The reason for driving the test pile is to obtain information for ordering the permanent piles, and to obtain additional information relative to driving the permanent piles.

It is the responsibility of the Contractor to supply test piles of sufficient lengths to provide for variation in soil conditions. If the piles furnished are not long enough, or are unsuitable in other ways, it will be necessary for the Contractor to supply acceptable piles. Followers will not be permitted in driving test piles. A follower is a member interposed between a pile hammer and a pile to transmit blows while pile head is below the reach of the hammer (pile head below the bottom of leads).

The State Construction Office should be notified of the date test piles will be driven.

6-5.7C Pile Driving Records

Pile driving records are to be kept in the Pile Driving Record Book, Form 450-004, which becomes part of the project final records. This book has sufficient room for a condensed pile driving history, pile layout, and miscellaneous notes in addition to the driving log for each pile. Number the piles on the sketch in the pile layout and use these for the Pile No. on the pile driving log.

The pile driving record book contains instructions for completing the driving log. In order for this log to furnish complete information on the pile driving work, it is imperative that it be filled out completely in accordance with the instructions in the book. If more space is necessary, use more than one page for the pile. Items in the heading which are the same for several piling, may be marked "Same as Pile No. ____."

The piling should be marked every foot (300 millimeters) of their lengths with crayon or paint unless there is some other method of determining when each foot (300 millimeters) of the pile has been driven. Count and record the number of blows per foot (300 millimeters) and hammer energy as the pile approaches bearing.

Test piles shall also be recorded in the pile driving record book. In addition, following the driving of each test pile, the Test Pile Record form shall be completed and sent to the appropriate offices the following day. This form should be filled in completely, including the rate/pressure of the hammer. Record the bearing value of the test pile for each foot (300 millimeters) as it is driven.

6-5.8 Measurement and Payment

Measurement and payment instructions are covered in Sections 6-05.4 and 6-05.5 of the *Standard Specifications*.

6-6 Bridge Railings

6-6.1 General

Railings shall be carefully aligned, both horizontally and vertically, to give a pleasing appearance. On multiple span bridges, the rail and wheel guard or curb heights at the ends of each span should be varied a sufficient amount to produce a uniform camber or grade from end to end of the bridge.

At the beginning and ends of horizontal curves and through vertical curves, the height of curbs may need to be varied so that the rail heights will be uniform above the curb. On any structure on which occurs a break in grade, horizontal curve with superelevation, vertical curve, or a combination of the three, the Project Engineer should plot to a large scale, the profiles of the roadway grades at the curb lines. From these profiles the grades for the tops of the curbs and railings can be properly determined. A slight hump in the rail over the whole structure is usually not objectionable, but a hump and then a sag is not permissible.

6-6.2 Measurement and Payment

Measurement and payment instructions are covered in Sections 6-06.4 and 6-06.5 of the *Standard Specifications*.

6-7 Painting

6-7.1 General

When inspecting bridge painting for steel structures, the Inspector should prepare a plan for the structure they will be inspecting. This plan will enable the Inspector to locate sections of the structure where painting activities occurred.

An Inspector's Daily Report should be filled out after every work day with the activities performed and related to the Inspector's bridge plan. In the daily report, the Inspector should identify the activities such as cleaning, blasting, and applying the base, intermediate, and finish coats. These daily reports should accurately represent the work accomplished and any noted deficiencies.

The Inspector should become familiar with the latest safety requirements. Contract environmental requirements should be reviewed as well.

Manufacture and shop mixing of paint materials are controlled from the State Materials Laboratory. Each container in each shipment of paint should bear a lot number, date of manufacture, type of paint and manufacturer's name.

When quantities of paint required for a particular job are 20 gallons (75 liters) or less, they may be manufactured and shipped without inspection and testing by the laboratory. A certificate of compliance with specifications signed by the manufacturer shall be presented to the Project Engineer by the Contractor at the time the paint is brought to the project site.

All paint shall be thoroughly mixed before using. Paint may be mixed by stirring with hand paddles or by using power stirrers.

All paints bearing dates of manufacture over one year old should be sampled on the basis of one sample per batch. Paint showing appreciable deviation from normal should be sampled and set aside until checked and released by the State Materials Laboratory.

The paint should be capable of application at the required thickness without any sags or runs. If it is not possible to do this, the State Materials Laboratory should be contacted for necessary steps to be taken.

6-7.2 Cleaning Metal

Cleaning for removal of rust or corrosion spots in repainting and cleaning of new steel shall mean "commercial" abrasive blasting as defined in the *Standard Specifications* or the Special Provisions.

Wire brushing and scraping shall normally be limited to removal of dirt and loose paint where corrosion is not involved.

All rust which cannot be removed by abrasive blasting shall be removed with chisels, hammers or other effective means as directed by the Engineer.

When called for in the *Standard Specifications* or Special Provisions, the entire structure shall be pressure flushed with water from the top down before other cleaning or painting is started. The nozzle should not be more than 9 inches (230 millimeters) from the surface being cleaned. A biodegradable detergent may be added to the water jet to remove oil and grease. Biodegradable detergents shall be approved by the State Materials Laboratory and precautions taken to avoid harmful residue on the steel.

In addition to the initial pressure flushing, all abrasive blasting residue must be removed after blasting and spotting and before application of additional paint. Pressure flushing may be required for this purpose if the Project Engineer deems it necessary.

New steel, shop coated before erection, shall have all erection and transportation scars, rivet heads, and welds cleaned and spot coated. If a dirt film has accumulated on the steel during the erection period this must be removed by flushing. All concrete residue must be removed from the floor system after the deck pour is completed. Generally, this may be accomplished by flushing before the residue has set up and while the pour is in progress.

On repainting projects, the Engineer or Inspector should observe and report to the State Bridge and Structures Engineer any spot or area where corrosion or other deficiencies are of such extent as to threaten the strength of the steel member. They should also observe areas where water becomes trapped to ultimately endanger the steel through corrosive action, and advise the Regional Operations/Construction Engineer, so the condition may be corrected.

Many bridges that are being repainted have been previously painted with lead based paint. When this is the case, the Contractor must submit a "Lead Health Protection Program". WAC 296-155-176. The waste generated from cleaning the bridge (bird guano, paint chips, etc.) must be tested as outlined in the contract provisions. Handling and disposal of this waste must be as prescribed by current state law. Contact your Regional Environmental Office regarding disposal of lead paint waste.

Containment systems are required by the Contract. Containment systems are required during the cleaning and painting of the bridge. These systems are necessary to prevent contaminants from entering state waters.

6-7.3 Applying Paint

All coatings shall be applied per the manufacturers recommendations.

Brushes and spray equipment should be in good condition. An intermediate stripe coat should be applied to the metal edges, inside angles, welds, bolt heads, nuts and rivets prior to the application of the full intermediate coat of paint. The use of inspection mirrors is required for reflecting light into the interior of boxed sections or members for locating painting defects.

The Inspector must check to see that the proper film thickness of paint is applied. Wet film thickness is to be measured immediately after the paint is applied and the dry film thickness is to be measured after the paint has become thoroughly dry and hard. It is difficult to measure the dry film thickness of paint on galvanized metal so it is necessary to measure the wet film thickness for each coat of paint as it is applied.

When an Inspector finds an area where the painting does not meet the specifications, they should mark the area with contrasting brightly colored alkyd paint from an aerosol can. A light coat of this spray paint will not adversely affect the paint job and it will effectively mark the area to tell whether correction work was performed on the area. Marking the area with spray paint provides the Inspector with an easy method of marking deficient areas and provides the Contractor a ready method of locating the areas that require additional work. This will also free the Inspector to concentrate on areas of serious deficiencies without losing control over those requiring minor corrections. When marking the final coat, be careful to mark only the area to be reworked.

The protection of the structure, traffic, and property from splatters and airborne paint spray is the responsibility of the Contractor. Since WSDOT may be criticized because of damage from paint, the Engineer must enforce the provisions of the contract to ensure protection therefrom.

Adequate staging, scaffolding, ladders, and fall protection are required to be provided by the Contractor to ensure safety to workmen, room for good workmanship, and adequate facilities for proper inspection.

Technical assistance and equipment are available at the State Materials Lab, and on request can be provided at the job site to ensure a good paint job.

During the preparation and painting of steel bridges, it is very important that the Inspector be aware of the potential impact to the surrounding environment. The air, water, and land quality are of major concern. WSDOT and environmental agencies are working together to establish guidelines for bridge painting. Policies and procedures involving environmental concerns will be addressed in the contract. Compliance to these specifications should be closely monitored.

6-8 Waterproofing

The instructions for this work are quite complete in Section 6-08 of the *Standard Specifications*.

Appendix A Concrete Mix Proportioning

The *Standard Specifications* previously had concrete mix designs that WSDOT would provide. The Contractor had the choice of using WSDOT's provided recipe or using a different mix. If the Contractor chose to provide a WSDOT mix, then WSDOT would be responsible for the performance of the mix provided it was produced within our specifications.

The proportions for mixes that used to be given in the *Standard Specifications* where in the nature of basic mixes which would need adjustment for the factors listed below as applicable to the job conditions. The following information is provided to give an understanding on how mix designs can be adjusted without substantially changing the mix characteristics.

Adjustments for cement content and workability cannot be applied until after batches have been mixed. The adjustment factors listed below are in the order in which they are to be applied.

Adjusting Mix Proportions

Adjustments to the proportions for WSDOT Provided Mixes that used to be shown in the *Standard Specifications* were to be made in the following order:

1. Bulk specific gravity
2. Crushed rock used as coarse aggregate
3. Substandard gradings
4. Free water in aggregates
5. Cement content**
6. Workability**

**The adjustments for either cement content or workability can only be made after testing has been completed from concrete batched with adjustments made for items 1 through 4.

Example:

Assume the following conditions for Class 3000 (20) Concrete without Air:

Coarse aggregate is crushed rock.

Bulk specific gravity, coarse aggregate is 2.76.

Bulk specific gravity, sand is 2.62.

Grading of coarse aggregate OK.

Grading of fine aggregate — finer than fine limits of specification by 25 percentage points. (Under Section 9-03 of the *Standard Specifications*, aggregate finer than the specifications may be used provided the cement content is increased.)

Concrete is non-air entrained.

Proportioning for Bulk Specific Gravity

The masses of aggregates that used to be given in the *Standard Specifications* were for a bulk gravity of 2.67. These values must be corrected for the actual bulk specific gravity (G) of the materials used. The adjusted batch mass to be used is:

$$\text{Adjusted Batch mass} = \text{Batch mass} \times \frac{G}{2.67}$$

Metric**Example:**

The mix proportions for Class 20 concrete are as follows in kg/m³.

Current batch masses:

Cement	320 kg
Fine Aggregate	775 kg
No. 2 Coarse Aggregates	1155 kg
Water	<u>160 kg</u>
	2410 kg

$$W/C (160/320) = 0.50$$

Batch masses corrected for bulk specific gravity:

(Aggregate masses rounded to nearest 5 kg.)

Cement	320 kg
Fine Aggregate	$775 \times (2.62/2.67) = 760$ kg
No. 2 Coarse Aggregates	$1155 \times (2.76/2.67) = 1195$ kg
Water	<u>160 kg</u>
	2435 kg

$$W/C (160/320) = 0.50$$

English**Example:**

The mix proportions for Class 3000 concrete are as follows in pounds per cubic yard.

Current batch weights:

Cement	540 lbs.
Fine Aggregate	1,315 lbs.
No. 2 Coarse Aggregates	1,950 lbs.
Water	<u>270 lbs.</u>
	4,075 lbs.

$$W/C (270/540) = 0.50$$

Batch weights corrected for bulk specific gravity:

(Aggregate weights rounded to nearest 10 lbs.)

Cement	540 lbs.
Fine Aggregate	$1,315 \times (2.62/2.67) = 1,290$ lbs.
No. 2 Coarse Aggregates	$1,950 \times (2.76/2.67) = 2,020$ lbs.
Water	<u>270 lbs.</u>
	4,120 lbs.

$$W/C (270/540) = 0.50$$

Proportioning for Crushed Rock

Crushed rock is angular in shape and contains more voids than gravel. Unless a greater proportion of mortar is provided to fill the excess voids, the concrete will be harsh as compared to that made with gravel.

Example:

As a starting mix, the weight (mass) of crushed rock should be reduced by 8 percent of the weight (mass) of the coarse aggregate shown, corrected for bulk specific gravity. At the same time the weight (mass) of fine aggregate should be increased the same number of pounds (kilograms) that coarse aggregate was decreased.

In general, no additional changes in the starting mix would be needed because of the presence of crushed oversize gravel in coarse aggregate. In the absence of contrary instructions from the State Materials Lab, no changes in cement per cubic yard (meter) would be necessary on account of the use of crushed rock in place of gravel as coarse aggregate. Decrease gravel $0.08 \times 2020 = 162$ (0.08×1155 kg = 93 kg); add same amount to fine aggregate.

Metric**Batch masses corrected for crushed rock: (Aggregate masses rounded to nearest 5 kg.)**

Cement	320 kg
Fine Aggregate	$(760 + 92) = 850$ kg
No. 2 Coarse Aggregate	$(1195 - 92) = 1105$ kg
Water	<u>160 kg</u>
	2435 kg

$$W/C (160/320) = 0.50$$

English**Batch weights corrected for crushed rock:**

(Aggregate weights rounded to nearest 10 lbs.)

Cement	540 lbs.
Fine Aggregate	$(1,290 + 162) = 1,450$ lbs.
No. 2 Coarse Aggregate	$(2,020 - 162) = 1,860$ lbs.
Water	<u>270 lbs.</u>
	4,120 lbs.

$$W/C (270/540) = 0.50$$

Proportioning for Substandard Gradings

The *Standard Specifications* permit the use, within certain limits, of aggregate graded finer than the fine limits as specified, provided cement is added. A reduction of 1 percent in weight (mass) of aggregate per cubic yard (meter) of concrete will result in an increase of approximately 1 percent in cement content.

The use of finer gravel with extra cement ordinarily will not cause changes in workability sufficient to warrant revising relative proportions of sand and coarse aggregate in the starting mix.

When finer sand (fine aggregate) is used with extra cement, however, the mix is almost certain to be oversanded, dependent on the amount of excess fineness of the fine aggregate. The starting mix should, therefore, be revised in accordance with the following rule:

After reducing weights (masses) of both fine aggregate and coarse aggregate proportionally to result in the required change in cement content, further reduce the weight (mass) of fine aggregate at the rate of $\frac{2}{3}$ pound per 100 pounds (0.67 kg per 100 kg) of cement for each 1 percent the fine aggregate passing each sieve is in excess of the maximums. Increase the coarse aggregate by the same number of kilograms (pounds) that the fine aggregate has been reduced to control over-sanding.

Metric**Example:**

Consider a fine aggregate having a gradation as follows:

Percent Passing				
Screen Size mm	Gradations Sample	Allowable* Specifications	Excess Maximum	Fineness
4.75	100	95-100		
3.35	97	82-98		
2.36	93	68-86	95	7
1.18	75	47-65	80	10
0.60	50	27-42	60	8
0.30	19	9.0-20.0	20	
0.15	6	0.0-7.0		
0.075	2.0	0.0-2.5	2.5	
				25%

*As designated in the *Standard Specifications*.

The 25 percent of excess fineness of fine aggregate requires an increase of 8 percent cement, calculated on the basis of $\frac{1}{3}$ percent for each percent of excess fineness ($25 \times \frac{1}{3} = 8$). The desired cement content will be $(320 \times 1.08) = 346$ kg per cubic meter.

The fine aggregate should next be decreased by $(\frac{2}{3} \times .25 \times 346) = 57.7$ kg to avoid over sanding. The coarse aggregate should be increased a like amount.

Batch masses corrected for substandard gradings:

(Aggregate masses rounded to nearest 5 kg.)

Cement		346 kg
Fine Aggregate	$(850 - 58) =$	790 kg
No. 2 Coarse Aggregate	$(1105 + 58) =$	1165 kg
Water		<u>160 kg</u>
		2461 kg

W/C $(160/346) = 0.46$

English**Example:**

Consider a fine aggregate having a gradation as follows:

Percent Passing

Screen Size	Gradations Sample	Allowable* Specifications	Excess Maximum	Fineness
4	100	95-100		
6	97	82-98		
8	93	68-86	95	7
16	75	47-65	80	10
30	50	27-42	60	8
50	19	9.0-20.0	20	
100	6	0.0-7.0		
200	2.0	0.0-2.5	2.5	
				25%

*As designated in the *Standard Specifications*.

The 25 percent of excess fineness of fine aggregate requires an increase of 8 percent cement, calculated on the basis of $\frac{1}{3}$ percent for each percent of excess fineness ($25 \times \frac{1}{3} = 8$). The desired cement content will be $(540 \times 1.08) = 583$ pounds per cubic yard.

The fine aggregate should next be decreased by $(\frac{2}{3} \times .25 \times 583) = 97$ pounds to avoid over sanding. The coarse aggregate should be increased a like amount.

Batch weights corrected for substandard gradings:

(Aggregate weights rounded to nearest 10 lbs.)

Cement		583 lbs.
Fine Aggregate	$(1,450 - 97) =$	1,350 lbs.
No. 2 Coarse Aggregate	$(1,860 + 97) =$	1,960 lbs.
Water		<u>270 lbs.</u>
		4,163 lbs.

W/C $(270/583) = 0.46$

Proportioning for Free Water in Aggregates

Free water is the water available in the aggregates that will combine with the cement during the mixing process in addition to the mix water added and if not accounted for will reduce the strength of the concrete. The planned mixing water is reduced by an amount of free water present in the aggregates in order to ensure the maximum water/cement ratio is not exceeded or water/cementitious ratio where fly ash is used.

The free water is defined as the amount of water present in the aggregates above the amount of absorbed water. Absorbed water will not be released by the aggregates during mixing of the concrete. The absorbed water is reported on the Pit Report and is expressed as a percentage of the weight (mass) of the aggregates.

The Moisture content of the aggregates is the total water in the aggregates expressed as a percentage of the dry weight (mass) of the aggregates. The free water can be determined by subtracting the amount absorbed water (absorbed content \times dry weight (mass) of the aggregates) from the total water in the aggregates (moisture content \times dry weight (mass) of the aggregates).

Metric**Example:**

The total amount of water permitted in the mix includes both the free water in the aggregates and the total mixing water (added at the plant and any water added in route to or on the project). For example, consider a Class 20 mix which has been determined to have a maximum water content of 160 kg per cubic meter.

Batch masses corrected for substandard gradings:

(Aggregate masses rounded to nearest 5 kg.)

Cement		346 kg
Fine Aggregate		790 kg
Coarse Aggregates		1165 kg
Water		<u>160 kg</u>
		2461 kg

W/C $(160 \text{ kg of water} / 346 \text{ kg of cement}) = 0.46$

Current tests of the aggregate stockpiles shows the moisture content as follows:

Fine Aggregates 4.0 percent

Coarse Aggregates 1.2 percent

The Pit Report from the State Materials Laboratory shows the amount of absorption as follows:

Fine Aggregates 1.5 percent

Coarse Aggregates 1.0 percent

Total Water in Aggregates:

Fine Aggregates $790 \text{ kg} \times 0.04 = 32 \text{ kg}$

Coarse Aggregates $1165 \text{ kg} \times 0.012 = 14 \text{ kg}$

Absorbed Water in Aggregates:

Fine Aggregates $790 \text{ kg} \times 0.015 = 12 \text{ kg}$

Coarse Aggregates $1165 \text{ kg} \times 0.010 = 12 \text{ kg}$

Free Water in Aggregates:

Fine Aggregates 32 kg of total water – 12 kg of absorbed water = 20 kg of free water

Coarse Aggregates 14 kg of total water – 12 kg of absorbed water = -2 kg of free water

Total Free Water in Aggregates: 20 kg from Fine Aggregates + 2 kg from Coarse Aggregates = 22 kg

Deducting free water gives 138 kg of allowable mixing water.

$(160 \text{ kg} - 22 \text{ kg}) = 138 \text{ kg}$ of allowable mixing water

The aggregate masses should be increased to reflect the free water and the amount of water added should be decreased to maintain the maximum water/cement ratio.

Batch masses corrected for free water in aggregates:

(Aggregate masses rounded to nearest 5 kg.)

Cement		346 kg
Fine Aggregates	$790 + 32 \text{ kg} =$	820 kg
No. 2 Coarse Aggregates	$1165 \text{ kg} + 14 \text{ kg} =$	1180 kg
Water		<u>139 kg</u>
		2485 kg

W/C (160 kg of water/ 346 kg of cement) = 0.46

English

Example:

The total amount of water permitted in the mix includes both the free water in the aggregates and the total mixing water (added at the plant and any water added in route to or on the project). For example, consider a Class 3000 mix which has been determined to have a maximum water content of 270 pounds per cubic yard. This is calculated to be $270 \text{ lbs.}/8.34 \text{ lbs./gallon} = 32.4 \text{ gallons}$.

Batch weights corrected for standard gradings:

(Aggregate weights rounded to nearest 10 lbs.)

Cement	583 lbs.
Fine Aggregate	1,350 lbs.
Coarse Aggregates	1,960 lbs.
Water	<u>270 lbs.</u>
	4,163 lbs.

W/C (270 lbs. of water/ 583 lbs. of cement) = 0.46

Current tests of the aggregate stockpiles shows the moisture content as follows:

Fine Aggregates 4.0 percent

Coarse Aggregates 1.2 percent

The Pit Report from State Materials Laboratory shows the amount of absorption as follows:

Fine Aggregates 1.5 percent

Coarse Aggregates 1.0 percent

Total Water in Aggregates:

Fine Aggregates $1,350 \text{ lbs.} \times 0.04 = 54 \text{ lbs.}$

Coarse Aggregates $1,960 \text{ lbs.} \times 0.012 = 24 \text{ lbs.}$

Absorbed Water in Aggregates:

Fine Aggregates $1,350 \text{ lbs.} \times 0.015 = 20 \text{ lbs.}$

Coarse Aggregates $1,960 \text{ lbs.} \times 0.010 = 20 \text{ lbs.}$

Free Water in Aggregates:

Fine Aggregates 54 lbs. of total water – 20 lbs. of absorbed water = 34 lbs. of free water

Coarse Aggregates 24 lbs. of total water – 20 lbs. of absorbed water = 4 lbs. of free water

Total Free Water in Aggregates: 34 lbs. from Fine Aggregates + 4 lbs. from Coarse Aggregates = 38 lbs.

Deducting free water gives 232 lbs. of allowable mixing water.

$(270 \text{ lbs.} - 38 \text{ lbs.}) = 232 \text{ lbs.}$ of allowable mixing water

The aggregate weights should be increased to reflect the free water and the amount of water added should be decreased to maintain the maximum water/cement ratio.

Batch weights corrected for free water in aggregates:

(Aggregate weights rounded to nearest 10 lbs.)

Cement		583 lbs.
Fine Aggregates	$1,350 \text{ lbs.} + 54 \text{ lbs.} =$	1,400 lbs.
No. 2 Coarse Aggregates	$1,980 \text{ lbs.} + 24 \text{ lbs.} =$	1,960 lbs.
Water		<u>232 lbs.</u>
		4,195 lbs.

W/C (270 lbs. of water/ 583 lbs. of cement) = 0.46

Correction for Cement Content

Determine the unit weight (mass) of the concrete, using ASSHTO Test Method T 121, of the first two trucks that meet all applicable acceptance test requirements. Using the unit weight (mass), calculate the yield and cement content, adjusting the calculations for a design air content of 6 percent if the mix is entrained. Average the two cement contents and compare the averaged cement content to the minimum cement content specified.

If the averaged calculated cement content is 10 pounds per cubic yard (5 kg per cubic meter) less than the minimum cement content specified, an adjustment is required. If a mix proportion adjustment is necessary, the adjustment shall be accomplished by adjusting the aggregate only. The fine to coarse aggregate ratio shall be maintained when the concrete mix is adjusted. The yield and cement content calculations should be provided to the contractor.

Metric**Example:**

The cement content is determined to be 340 kg per cubic meter whereas the minimum cement content of 346 kg per cubic meter was specified. This amount is 6 kg per cubic meter less, so an adjustment is required. The aggregate masses should be decreased. The batch masses should be corrected as follows:

Fine Aggregates $820 \text{ kg} \times 340/346 = 805$
rounded to nearest 5 kg 15 kg decrease

Coarse Aggregates $1180 \text{ kg} \times 340/346 = 1160 \text{ kg}$
rounded to nearest 5 kg 20 kg decrease

Batch masses corrected for cement content: (*Aggregate masses rounded to nearest 5 kg.*)

Cement	346 kg.
Fine Aggregates	805 kg
Coarse Aggregates	1160 kg
Water	<u>139 kg</u>
	2450 kg

W/C (160 kg of water/346 kg of cement) = 0.46

English**Example:**

The cement content is determined to be 568 pounds per cubic yard whereas the minimum cement content of 583 pounds was specified. This amount is 15 pounds per cubic yard less, so an adjustment is required. The aggregate weights should be increased. The batch weight should be corrected as follows:

Fine Aggregates $1,400 \text{ lbs.} \times 568/583 = 1,360 \text{ lbs.}$
rounded to nearest 10 lbs. 40 lb. decrease

Coarse Aggregates $1,980 \text{ lbs.} \times 568/583 = 1,930 \text{ lbs.}$
rounded to nearest 10 lbs. 50 lb. decrease

Batch weights corrected for cement factor: (*Aggregate weights rounded to nearest 10 lbs.*)

Cement	583 lbs.
Fine Aggregates	1,360 lbs.
Coarse Aggregates	1,930 lbs.
Water	<u>232 lbs.</u>
	4,105 lbs.

W/C (270 lbs. of water/583 lbs. of cement) = 0.46

Revision for Workability (Example)

During the placing of the first truck, some difficulty was found in the region of a group of closely spaced reinforcing bars. The same situation will exist on the next pour. It is decided to increase the fine aggregate content somewhat and the entire 90-pound (35 kg) decrease (as calculated previously) for cement content is deducted from the coarse aggregate. The new batch masses are as follows:

Metric

Batch masses corrected for workability: (*Aggregate masses rounded to nearest 3 kg.*)

Cement	346 kg
Fine Aggregate	820 kg
No. 2 Coarse Aggregate (1180 – 35)	1145 kg
Water	<u>139 kg</u>
	2450 kg

W/C (160/346) = 0.46

English

Cement	583 lbs.
Fine Aggregate	1,400 lbs.
No. 2 Coarse Aggregate (1,980 – 90)	1,890 lbs.
Water	<u>232 lbs.</u>
	4,105 lbs.

W/C (270/583) = 0.46

The goal should be to use the lowest percentage of fine aggregate that is consistent with job conditions and will permit placing the concrete without voids and finishing it to a satisfactory surface. If the mix is undersanded, however, the tendency will be to make up for a lack of inherent workability by using an excessive amount of mixing water. Such concrete tends to segregate in handling and placing and is to be avoided. The sand content of the mix, however, should not be increased merely to relieve the Contractor of the work of vibrating that is required to be performed under the specifications.

A grossly oversanded mix will be recognized by the apparent shortage of coarse aggregate and by its “sticky” character. Those particles of coarse aggregate that are readily visible will appear to be floating independently in a matrix of mortar. In a badly undersanded mix, the coarse aggregate will be very conspicuous, the concrete will be hard to handle with a shovel regardless of its wetness and there will be a marked tendency for separation of the mortar from the coarse aggregate. Between these extreme limits, the best mix must be determined by experience and careful study of the results obtained during placing of the concrete and upon removal of the forms.

If the fine aggregate is graded near the coarse limits of the specifications and the coarse aggregate is near the fine limit, the concrete is apt to be harsh. Increasing the fine aggregate content in such cases probably will not result in much improvement. The grading of the fine aggregate and the coarse aggregate should be improved. The *Standard Specifications* require rejection or alteration of the aggregates when the resulting concrete is too harsh.

Generally speaking, a reduction or increase of 20 pounds (20 kg) of fine aggregate per 100 pounds (100kg) of cement will make a pronounced change in the appearance and workability of the concrete. The Project Engineer should work within these limits (after revising proportions of the starting mix as outlined in Chapter 6-2 of this manual) to secure the best results possible. Changes should be made only after consultation with the State Materials Laboratory.

8-0	Introduction	8-1
<hr/>		
8-1	Erosion Control	8-1
8-1.1	TESC Planning and Implementation	8-1
8-1.2	TESC Inspections	8-2
8-1.3	Water Quality Monitoring	8-3
8-1.4	Record Keeping	8-4
8-1.5	Final Stabilization	8-4
8-1.6	Measurement and Payment	8-5
<hr/>		
8-2	Roadside Planting	8-5
8-2.1	General	8-5
8-2.2	Landscape Terminology	8-6
8-2.3	Reference Reading	8-8
8-2.4	Inspection of Planting Stock	8-8
8-2.5	Layout	8-11
8-2.6	Materials	8-13
8-2.7	Progress Schedule	8-14
8-2.8	Inspection During the Plant Establishment Period	8-14
8-2.9	Measurement and Payment	8-15
<hr/>		
8-3	Irrigation System	8-15
8-3.1	General	8-15
8-3.2	Layout	8-15
8-3.3	Materials	8-16
8-3.4	Inspection	8-16
8-3.5	Installation	8-16
8-3.6	Cross-connection Control, Backflow Prevention	8-17
8-3.7	Serving Utility	8-17
8-3.8	As-Built Plans and System Orientation	8-18
8-3.9	Measurement and Payment	8-18
<hr/>		
8-4	Curbs, Gutters, Spillways, and Inlets	8-18
8-4.1	General	8-18
<hr/>		
8-11	Guardrail	8-18
8-11.1	General Instructions	8-18
8-11.2	Erection of Posts	8-18
8-11.3	Terminals	8-18
8-11.4	Measurement and Payment	8-18
<hr/>		
8-12	Chain Link Fence and Wire Fence	8-19
8-12.1	General	8-19
8-12.2	Clearing and Grading	8-19
8-12.3	Measurement and Payment	8-19
<hr/>		
8-14	Cement Concrete Sidewalks	8-19
8-14.1	General	8-19
8-14.2	Placing, Finishing, and Curing Concrete	8-19
8-14.4	Measurement and Payment	8-19

8-20	Illumination, Traffic Signal Systems, and Electrical	8-19
8-20.1	General	8-19
8-20.2	Materials	8-19
	8-20.2A Approval of Source	8-19
	8-20.2B Shop Drawings for Illumination and Signal Standards	8-20
8-20.3	Relations With the Serving Utility	8-21
8-20.4	Inspection	8-21
8-20.5	As-Built Plans	8-21
8-20.6	Construction	8-21
	8-20.6A Foundations	8-21
	8-20.6B Conduit	8-22
	8-20.6C Junction Boxes	8-22
	8-20.6D Wiring	8-22
	8-20.6E Ground	8-22
	8-20.6F Lighting Standards, Strain Poles	8-22
	8-20.6G Existing Illumination Systems	8-22
	8-20.6H Service Equipment	8-22
	8-20.6I Traffic Signal Systems	8-22
	8-20.6J Testing	8-22
	8-20.6K Electrical Safety Tags	8-23
8-20.7	Prevention of Corrosion of Conduit	8-23
8-20.8	Measurement and Payment	8-23
<hr/>		
8-21	Permanent Signing	8-23
8-21.1	General	8-23
8-21.2	Sign Location	8-24
8-21.3	Approval of Materials	8-24
8-21.4	Inspection	8-24
8-21.5	Bolting Base Connections	8-24
8-21.6	Measurement and Payment	8-24

If WSDOT can identify potential erosion areas early, we can prevent problems such as stop work orders and fines from Ecology, construction delays, and unfavorable publicity. Site inspections allow us to verify that the Contractor is implementing the plan and that it is working effectively. You should walk through the site with the TESC plan in hand to evaluate whether BMPs were installed as specified on the plan drawings. You may need to assist the Contractor with identifying appropriate locations to ensure the site is always prepared for a storm. Inspections must also be made during storm events to evaluate how well BMPs are performing.

The effectiveness of BMPs must be evaluated in the field. If installed BMPs are ineffective, replacement BMPs must be selected and installed. If the quality of installation or lack of maintenance is responsible for a failure, the contractor should repair the BMPs at no cost to WSDOT. If the failure is a result of faulty BMP selection, we must identify a new BMP. Any changes to BMPs in the field must be recorded or drawn onto the TESC plan sheets and documented on the site inspection form. For recommended erosion prevention practices see Chapter 6 of the *Highway Runoff Manual* M31-16. For site-specific recommendations, contact Region Environmental or Environmental Services Erosion Control Coordinator.

Everyone on the construction site should know what to do when an environmental agency representative visits the site. The Contractor's ESC Lead is trained to direct the agency representative to the project engineer or the inspector delegated in charge of erosion issues. All Contractors working on the site must know who is in charge of erosion control for WSDOT. Contractors should be directed to help resource agency staff locate this person. When contractors direct resource agency staff to the person in charge problems are solved more quickly and a positive image is established. If there is a general difference of opinion with an agency representative, the issue should be immediately elevated to the Project Engineer, or Regional Engineering or Environmental Staff who can help develop an effective solution.

8-1.3 Water Quality Monitoring

Water quality monitoring is a permit requirement on many WSDOT construction projects. Sampling frequency and location, and compliance triggers vary, depending on the type of permit issued. WSDOT staff are responsible for collecting water quality samples, and to meet this requirement, WSDOT has developed protocols in Chapter 6 of the *Highway Runoff Manual* (M31-16) that dictate when, where, and how these samples are collected. Turbidity, defined as the visual clarity of the water, is a measure of how much mud is in construction site runoff water, and is the most common pollutant for which WSDOT is required to sample. The second most common pollutant is water pH, a measure of the acidity or alkalinity of water, and is measured to determine if the runoff is too acidic or alkaline. Water that is too acidic or alkaline will kill fish. Construction activities involving concrete may alter the pH of stormwater in a manner that will harm fish, if the runoff is not treated.

Projects that involve in-water work, and are issued a 401 Certification (certification from the state that the proposed project will meet state water quality standards and other aquatic protection regulations) are required to collect both upstream and downstream sample for turbidity and for pH if concrete work is occurring. The monitoring protocols in Chapter 6 of the *Highway Runoff Manual* must be followed. Upstream sample values are compared to downstream sample values to verify that water quality standards are achieved. WAC 173-201A, defines the required standards as follows:

Turbidity shall not exceed 5 nephelometric units (NTU) over background turbidity when background turbidity is 50 NTU or less, or more than a 10 percent increase in turbidity when background turbidity is more than 50 NTU.

pH shall be within the range of 6.5 to 8.5 with a human-caused variation within the range of less than 0.0=0.5 units, depending on the class of the waterbody.

The NPDES General Construction permit requires that after October 1, 2006, all projects with greater than 5 acres of soil disturbance sample for turbidity. After October 1, 2008, all projects with greater than 1 acre of soil disturbance will be required to sample for turbidity. Samples must be collected at all outfalls (locations where construction stormwater discharges off-site or into state waters). These samples are intended to verify that a TESC plan is well implemented and that BMPs are working effectively. Outfall sample values must be compared to benchmark values for turbidity, and pH if applicable, to verify that WSDOT is in compliance with the permit.

pH samples must be collected on projects with greater than 1 acre of soil disturbance if more than 1000 cubic yards of concrete is curing simultaneously during a 30 day period, or if cement or kiln dust amended soils are present. If the treatment of pH for concrete work is a requirement of the contract, the Contractor shall be responsible for sampling any possible high pH water and for neutralizing it, if necessary, prior to discharge to surface waters.

Process water or wastewater (nonstormwater) that is generated on-site, including water generated during concrete grinding, ruffling, washout, and hydrodemolition activities, cannot be discharged to waters of the state under the NPDES General Construction Permit. Offsite disposal of concrete process water must be in accordance with the *Standard Specifications* or contract provisions. Under limited circumstances, infiltration of process water may be acceptable. As standards for dealing with process water are still evolving, contact region environmental and Headquarters Water Quality Program to determine if infiltration is an acceptable option.

Sometimes neighboring sites or projects cause increases in turbidity that can be falsely blamed on WSDOT. It is important to document such events and report them so that we are not unfairly blamed for other people's water quality problems.

We are required by law to report any water quality violations to the Department of Ecology. WSDOT has developed Environmental Compliance Assurance Procedures (ECAP) that must be implemented immediately to report any permit violation. These procedures are contained in Section 1-2.2K(1) of this manual.

It is important that environmental agencies hear about a problem from us as soon as it happens rather than from the public or by discovering it themselves. Enforcement actions rarely occur when projects self-report violations. Self-reporting sends a message that we are making a good faith effort and have nothing to hide. Not reporting suggests that we are covering up a problem or simply do not care.

As part of ECAP, all certified Contractor ESC Leads have been trained to notify the project engineer immediately upon discovery of a water quality violation or situation that may lead to a violation. Nevertheless, it is our responsibility to be watching ourselves. If a problem is identified, we should notify the project engineer and immediately take all measures possible to reduce impacts of the problem. The project engineer or a designee reports violations to resource agencies.

8-1.4 Record Keeping

The NPDES Construction Stormwater General Permit requires that water quality data be submitted monthly for all projects greater than 5 acres of soil disturbance after October 1, 2006. HQ Environmental Services Office will batch send data to Ecology monthly via the Water Quality Monitoring database. Therefore, all projects must enter water quality data into the database.

WSDOT is also required to maintain a Site Log Book for each project that is to remain on-site. This Log Book must contain copies of all site inspection reports performed by the Contractor's ESC Lead, copies of water quality monitoring data (collected by WSDOT), and any information pertaining to installation and maintenance of Best Management Practices (BMPs).

WSDOT must retain documentation of compliance with permit requirements during the life of the contract and for a minimum of three years following the termination of the contract. This includes: the Site Log Book, water quality monitoring results, inspection reports, TESC plans and any other documentation.

8-1.5 Final Stabilization

The permanent protection of earth cut and fill slopes should be accomplished as soon as possible. When provided in the contract, topsoil should be evenly placed on the slopes at the specified depth for areas to be seeded. After placement of top soil, large clods, hard lumps, rocks 2 inches (50 millimeters) in diameter or larger, and litter shall be raked up, removed, and disposed of by the Contractor. Refer to *Standard Specification 8-02.3(4)* for more information.

Areas to be seeded without top soils are to be prepared after final grading so that the soil surface is rough and loose, with ridges and furrows (narrow depressions) perpendicular to

the slope or to the natural flow of water. This will slow the water velocity, increase water detention and infiltration, decrease runoff, and promote grass growth. This can be done through the use of a cleated roller, crawler tractor, or similar equipment. Refer to *Standard Specification 8-01.3(2)A* for more information.

Seed and fertilizer are to be uniformly applied on the slopes at the rate and mixture specified in the contract. Application shall be by an approved hydro-seeder, blowing equipment, properly equipped helicopters, or power drawn drills or seeders. Where areas are inaccessible for this equipment, or when specified, approved hand seeding will be permitted.

In order for the Contractor to order the proper amount of materials for the project and to provide the Inspector a method of checking the rate of application of the seed and fertilizer, the Project Engineer should measure the areas to be seeded and fertilized as soon as they can be determined and inform the Contractor of the anticipated acreage. If, in the opinion of the Engineer, the seeding and fertilizing areas can be accurately determined using digital terrain modeling or other design data, the Engineer has the option of using this data in lieu of field measuring. During the seeding and fertilizing operation, the Inspector shall see that the material is placed at a uniform rate and compare the amount of seed and fertilizer applied, by counting the number of bags of material, with the area covered to verify that the proper rate of application is being placed.

The seed and fertilizer may be applied in one application provided the seed and fertilizer are not mixed more than 1 hour prior to application. Mixing more than 1 hour prior to application will damage the seed. Otherwise, the seed shall be applied in a separate application prior to fertilizing and mulching. Lime should be applied separately from the seed and mulch.

Wood Cellulose fiber may be applied with seed and fertilizer West of the summit of the Cascade Mountain Range and only upon written request by the Contractor and approval of the Engineer East of the summit of the Cascade Mountain Range. Consult with the Regional Landscape Architect, the State Regional Liaison Landscape Architect, or the State Horticulturist.

Mulch must be uniformly applied to the seeded areas within 48 hours after seeding. Straw mulch is to be applied with a forced air spreader. Straw mulch may not be practical in windy areas. Wood cellulose fiber is normally applied with hydraulic equipment. Checks are also necessary to determine that the mulch is applied uniformly and at the required rate. In areas, which cannot be reached by a mulch spreader, hand methods resulting in uniform application may be used.

In some areas, it may be desirable to anchor the mulch with an application of tackifier. The *Standard Specifications* are quite complete in the method of applying tackifiers see Section 9-14.4(7). The rate of application is varied from area to area to obtain the best results. Check with the Regional Landscape Architect, the State Regional Liaison Landscape Architect, or the State Horticulturist for advice on the proper application rate.

at its point of accumulation and will result in a permanently weakened spot. It is necessary, therefore, that this excess cement be wiped at the time the joint is made and that the Inspector check to ensure that it has been done.

Plastic pipe is subject to considerable expansion and contraction with temperature changes. To provide for this, pipe should be snaked from side-to-side in the trench.

Care shall be taken during the installation of the pipe to ensure that rock, dirt or other debris is not allowed to enter the open ends of the pipe.

Electrical control wire between the automatic controller and the automatic control valves, shall be bundled together at ten-foot intervals and snaked from side-to-side in the trench, either adjacent to or beneath the irrigation pipe. Snaking of the wire helps eliminate wire stressing or breakage caused by expansion or contraction of the earth due to variations in moisture content or extreme seasonal temperature fluctuations. Placement of the wires adjacent to or beneath the irrigation pipe is for protection against damage from possible future excavation.

Electrical splices shall be permitted only in valve boxes, junction boxes, pole bases, or at control equipment. No direct burial splices shall be allowed. Types of electrical splices allowed in WSDOT irrigation projects shall be only those approved for use by the State Materials Laboratory. Approved electrical splices are listed in the *Qualified Products List* or may be approved through the use of a RAM.

Freeze protection must be provided as specified in the project documents. Either a three-way valve with compressed air fitting for blowing water out of the lines, or drain valves placed at the low point of each lateral must be used. If the three-way valve and air fitting is to be used, it must comply with one of the designed installations approved for use by the Washington State Department of Health. If drain valves are used, care must be taken to ensure that the lateral lines are properly sloped to provide complete drainage.

8-3.6 Cross-connection Control, Backflow Prevention

A cross-connection is any actual or potential connection between a potable water supply and a source of contamination or pollution.

A cross-connection is not in itself dangerous. It is only when contamination passes through it and into a potable water system that a health hazard is created.

Backflow is the unwanted reverse flow of liquids in piping system and is the major means by which contamination of potable water can occur. Backflow is the result of either back pressure or back-siphonage. Backflow from back pressure can occur any time pressure produced in the non-potable piping system is greater than that existing in the potable side. Backflow from back-siphonage is the result of a negative or subatmospheric pressure within a potable water system, causing contaminants from the non-potable side to be suctioned in.

Irrigation systems supplied by domestic potable water systems are potential pollution hazards to the potable water. Such cross-connections require protection to prevent the possibility of backflow.

A backflow prevention, cross-connection control device is any device, method, or type of construction used to prevent backflow into a potable water system.

An approved backflow prevention, cross-connection control device is one that has been investigated and approved by an appropriate regulatory agency. The approving or regulatory agency for backflow prevention, cross-connection control devices for the state of Washington is the Department of Environmental Health. This agency periodically publishes a list of approved cross-connection control devices.

The local water purveyor determines the type of backflow prevention device to be used to protect domestic water supply systems under their jurisdiction. This determination is based upon the water purveyor's estimation of the probability of backflow occurring and the degree of hazard created if it should. Once the type of device to be used has been determined, the device shall be selected from the Department of Environmental Health current list of approved cross-connection control devices.

Installation of cross-connection control devices shall conform to the *Standard Specifications*, the project plans and documents, the manufacturer's recommendations, and the "Accepted Procedure and Practice in Cross-Connection Control Manual". In all cases, the backflow prevention device shall be tested by a certified inspector prior to activating the system. Additionally, Form 540-020, shall be filled out and the appropriate distribution made.

8-3.7 Serving Utility

The Project Engineer shall contact the serving utilities as soon as the Contractor's schedule is known, to arrange for the actual service connections, and to ensure that all agreements are completed and billing procedures are established.

8-3.8 As-Built Plans and System Orientation

The Project Engineer is required to submit As-Built Plans in accordance with Chapter 10-3.7 of this manual.

Accurate As-Built Plans are a valuable and necessary aid in designing and constructing future projects for the area, and for maintenance and repair of the irrigation system. Therefore, it is imperative that these As-Built Plans show the true location, size, and quantity of components installed.

Sections 1-05.3 and 8-03.3(10) of the *Standard Specifications* state that the Contractor is responsible for supplying working drawings, corrected shop drawings, schematic circuit diagrams or other drawings necessary for the Engineer to prepare corrected plans to show the work as constructed. To help ensure accuracy of this information requires that the Contractor or field representative record each change as it is completed. In addition, the Inspector shall inspect and verify this information prior to the commencement of backfilling. Upon completion of this, all working drawings and pertinent information shall be submitted for the Project Engineer's approval and use in preparing the As-Built Plans.

The Contractor is also required to conduct a training and orientation session for WSDOT personnel covering the operation, adjustment, and maintenance of the irrigation system. The Project Engineer shall arrange to have the maintenance personnel who will be involved with the irrigation system attend this orientation session. The As-Built Plans shall be available so they can be reviewed and all features explained. One copy of the As-Built Plans shall be presented to the maintenance personnel at that time, along with parts lists and service manuals for all equipment.

8-3.9 Measurement and Payment

Measurement and payment instructions are covered in Sections 8-03.4 and 8-03.5 of the *Standard Specifications*.

8-4 Curbs, Gutters, Spillways, and Inlets

8-4.1 General

The *Standard Specifications* specify the class of concrete to use when constructing the various items. Quite often the Contractor places the concrete for these miscellaneous items at the same time of placing concrete for other work. When this is the case, it is usually more convenient for the Contractor to use the same class of concrete for all the work during the day. At the Contractor's request, the Project Engineer may accept a higher class of concrete in lieu of the class specified at no increased cost to WSDOT. This substitution should be documented in the diary, Inspector's daily report, or other records.

8-11 Guardrail

8-11.1 General Instructions

Since guardrail is expensive to construct and requires continual maintenance, it should be constructed only where hazardous conditions justify its use. During construction, the Project Engineer should investigate eliminating the need for guardrail by flattening the slopes, or otherwise removing, relocating, or modifying the hazard whenever possible. The final evaluation of the need for guardrail should be made in the field after the embankment has been constructed. Even though the fill has been widened for guardrail, it should not be constructed if it is determined at this time that guardrail is not needed.

See Section 710 of the *Design Manual* and other pertinent instructions for design criteria for guardrail.

For safety reasons, the guardrail shall have the ends flared away from the roadway and anchored in accordance with the appropriate *Standard Plans*. The construction inspector should pay particular attention to make sure that the rail washers are consistent with the current *Standard Plans*.

8-11.2 Erection of Posts

The posts shall be set to the true line and grade of the highway and spaced as shown on the *Standard Plans*. Post may be placed in dug or drilled holes. Ramming or driving will be permitted only if approved by the Engineer and if no damage to the pavement, shoulders and adjacent slopes results therefrom. The post holes shall be of sufficient dimensions to allow placement and thorough compaction of selected backfill material completely around the post.

8-11.3 Terminals

Installation of guardrail terminals listed in the Qualified Products List shall be by an installer, that has been trained and certified by the manufacturer or is supervised by a representative of the manufacturer. The inspector should request to see the certification. The date on the certification must not be prior to the latest approved effective date for the device. A listing of the latest approved effective dates will be sent to each Project Engineer's Office when changes are made or can be requested from the Design Office.

8-11.4 Measurement and Payment

Measurement and Payment Instructions are covered in Sections 8-11.4 and 8-11.5 of the *Standard Specifications*.

Field Test No. 4 of Section 8-20.3(11) of the *Standard Specifications* is to be performed on all illumination and signal projects. It is especially important that the Project Engineer obtain the consultation of the Regional Traffic Engineer in this portion of the field test when the tests are being performed in a traffic signal controller. Since the mechanism in these controllers is so interrelated and complex, only persons thoroughly schooled in such control mechanisms are qualified to determine when particular timing circuits and sequences are functioning properly. The simple turning on of an electrical switch and watching a light come on is not an acceptable electrical test.

8-20.6K Electrical Safety Tags

Commencing at the time that the serving utility makes the power drop to WSDOT electrical service cabinets, electrical safety tags shall be used. Any electrician working on any main or branch circuit shall cause that circuit to be de-energized and shall place an electrical safety tag at the point that the circuit is open. The electrician shall sign the electrical safety tag and only that electrician may make subsequent circuit alterations or remove the tag.

If the circuit that the electrician de-energized to work on is serving traffic, the electrician shall arrange the work so the circuit may be energized for nighttime operation. The electrician shall remove the safety tag and energize the circuit before leaving the jobsite and upon returning to work on the circuit, shall de-energize it again and place an electrical safety tag back on the circuit.

8-20.7 Prevention of Corrosion of Conduit

Installation of conduit should be supervised to ensure against physical abrasion of the conduit or for rust on threads which would destroy the integrity of the galvanizing.

Electrically caused corrosion of metallic conduit is easy to avoid by proper construction supervision. If the causes of this type of corrosion are not properly inspected and controlled, the extent of electrically caused corrosion is commonly far more severe than the chemically caused corrosion.

In any metallic conduit system, the metallic conduit itself serves an electrical function. This function is to provide a low resistance return path for electricity which may leak out of an electrical conductor due to scraped insulation, cracks, or other causes. A point at which electricity can leak or escape from an electrical wire is called a "fault". When electricity flows through any non-insulated path (conduit), it can establish an electrical phenomenon called electrolysis. Electrolysis results in the transfer of metal from one location to metal at another location. Through this means, the metal that was used to make the metallic conduit may be transferred to other locations on the same conduit run or to other metallic appurtenances. With the ultimate degeneration of conduit at any point, the return path for the electricity through the conduit system itself is destroyed. In the event that a portion of a conduit was destroyed in this means and with the subsequent damage or failure of electrical conductors beyond that point, electricity would not have the ability to complete the circuit from the wire through the conduit system and return to service enclosure which

would, in turn, cause a fuse to blow or a circuit breaker to trip. Hence, the protection offered by our electrical overload equipment is totally nullified.

To prevent this type of ultimate failure of the electrical system, all conduit joints should be carefully inspected to ensure that they are physically tight and that a good electrical bond does exist from one piece of conduit through the nipple to each adjoining piece of conduit. Additionally, conduit threads should be painted with an approved corrosion inhibiting conduit paint. Any loose or improper union between conduit sections or conduit and junction boxes is a point of high resistance to the flow of electricity. When such a condition exists and with the faulting of an electrical conductor within the system, electricity does not have an easy return to its point of service. Electricity then takes alternate routes through the earth, structures, etc. This, in particular, establishes the condition of electrolysis and results in even greater failure of the physical system. The physical system failure attributed to this may present itself from two to five years after construction.

The seriousness of this matter cannot be overstressed in electrical construction. It is so important that if one factor, and only one factor, was to be examined on each electrical project, it would be the search for conditions that would result in electrolysis and the sloppy workmanship that causes them.

Additionally, to prevent electrical damage to the conduit system and, in particular, during the time of project construction, the conduit shall not be used as a temporary neutral return nor shall the conduit be used for the ground of construction equipment, i.e., welders, hand tools, etc.

8-20.8 Measurement and Payment

Measurement and Payment instructions are covered in Sections 8-20.4 and 8-20.5 of the *Standard Specifications*.

8-21 Permanent Signing

8-21.1 General

The complex design of today's freeway facilities has created an increased demand on signing. Signing is one of the features a layperson readily can evaluate on a new facility. Improper or inadequate signing detracts from the quality of the basic construction features of the project. Misplaced or irregular usage of signs on interchanges creates a critical hazard to traffic and hinders the proper operation of the facility.

Today's destination sign has increased in size to the extent that it is no longer a minor installation and the amount of time required to install an average freeway sign project has been extended to the point that close cooperation between all forces on highway construction projects is vital so that the facility is signed properly when opened to traffic.

Any sign that is erected on a section of roadway carrying traffic ahead of the time the message on the sign will be applicable to the traffic shall be covered in accordance with Section 8-21.3(3) of the *Standard Specifications* until the appropriate time for uncovering it. It is essential that signs with conflicting messages not be displayed.

8-21.2 Sign Location

Since it is impossible to visualize the actual physical features of final grade elevations, vertical curves, trees, and other factors that affect proper sign placement in the initial sign plan stage, it becomes necessary to make adjustments in sign location just prior to installation. The Project Engineer and Regional Traffic Engineer should coordinate a study of each location to determine that each sign will be in the most efficient location for visibility and nighttime reflectivity. Advance Destination signs may be moved up to 500 feet (150 meters) in either direction if severe ground or slope conditions are encountered. If the sign must be moved more than 500 feet (150 meters), consideration should be given to revising the distance on the sign. All sign locations shall be staked by the Engineer prior to installation by the Contractor.

Following staking of the signs, the Project Engineer should furnish the Contractor with the list of post lengths for steel posts. For wooden posts, the Contractor should be able to order posts in commercial lengths from the approximate lengths shown in the plans. Final lengths of timber posts will be determined or verified by the Engineer at the request of the Contractor prior to fabrication.

Anytime a new bridge mounted sign bracket, cantilever sign structure, or sign bridge structure is erected, a new structure inventory identification number needs to be assigned to the structure by the State Bridge and Structures Office, Bridge Preservation Office. The Project Engineer shall request a sign structure identification plate for installation on the sign support by the Contractor. Installation instructions will be provided by the State Bridge Preservation Office.

Anytime an existing bridge mounted sign bracket, cantilever sign structure, or sign bridge structure is removed from service, the Contractor shall remove the identification plate and give it to the Project Engineer. The Project Engineer will return the identification plate to the State Bridge Preservation Office so the sign structure can be removed from the inventory.

8-21.3 Approval of Materials

All materials for installation on permanent signing projects should be selected off the *Qualified Products List* (QPL) or listed on the Request for Approval of Materials (RAM). Materials listed on RAM not listed on the QPL shall be submitted to the State Materials Laboratory for appropriate action as soon as possible. Shop drawings of sign structures shall be reviewed by the Project Engineer for conformance with *Standard Plans* G-2 through G-9b. The Project Engineer approves plans in conformance with the standard plans. Any request to deviate from standard plans should be reviewed by the State Bridge and Structures Office.

The six sets of shop drawings of special design sign structures and/or special sign fittings shall be submitted to the State Bridge and Structures office, which will coordinate approval with the State Materials Laboratory. After approval, the State Bridge and Structures office will retain one set and forward two sets to the State Materials Engineer and send three sets to the Project Engineer. One of the State Materials Engineer's sets will be forwarded to the Fabrication Inspector. The Project Engineer will send two sets to the Contractor, who will forward one set to the Fabricator.

If a structural review is not required by the State Bridge and Structures office, the Project Engineer shall mark all changes in red on all six copies and distribute per the Shop Plans and Working Drawings Table in Chapter 1-2.4H of this manual.

All drawings shall be clearly marked ("Approved as Noted", "Returned for Correction", or "Approved") before returned to the Contractor, whether reviewed and checked by the Project Engineer or the State Bridge and Structures Office.

The special provisions of the contract deal to a great extent with the proper fabrication of the signs to be installed and the manufacturing process requiring the use of approved application equipment. It is necessary, therefore, that the firm who actually makes the signs be approved as a source of supply. Such approval is made by the State Materials Laboratory.

8-21.4 Inspection

A "fabrication approval" decal dated and signed by the Sign Fabrication Inspector shall appear on the back of all permanent signs that are received on the project. Signs without such indicated approval shall not be permitted on the project. Damaged signs shall be rejected at the project site.

At the completion of a sign installation, the Project Engineer shall request the Regional Traffic Engineer to assist in making a final inspection.

8-21.5 Bolting Base Connections

It is important to ensure the proper torque is applied to bolts connecting the bases when installing *Standard Plan* G-8 and G-8a Sign Structures. Procedures for assembling and inspecting high strength bolts are covered in Chapter 6-3.6B of this manual. All base assemblies shall be checked with a torque wrench. This can be accomplished either by observing the Contractor's torquing or by the Inspector utilizing the Region's torque wrench. Documentation of the torquing method used should be accomplished by proper entries in the Inspector's Daily Reports.

8-21.6 Measurement and Payment

Measurement and Payment instructions are covered in Sections 8-21.4 and 8-21.5 of the *Standard Specifications*.

9-1	General	9-1
9-1.1	Introduction	9-1
9-1.2	Requirements	9-1
9-1.3	Sample and Test Numbering	9-1
	9-1.3A Preliminary Samples and Tests	9-1
	9-1.3B Acceptance Samples and Tests	9-1
	9-1.3C Vacant	9-1
	9-1.3D Verification Samples and Tests	9-1
9-1.4	Form Letters	9-1
9-1.5	Project Material Certification	9-1
	9-1.5A Record of Materials (ROM)	9-6
	9-1.5B Approval of Materials	9-6
	9-1.5C Field Verification of Materials	9-7
	9-1.5D Materials Fabrication Inspection Office — Inspected Items Acceptance	9-7
	9-1.5D(1) Inspected Items, Stamps and Tagging Identification	9-8
	9-1.5E Manufacturer's Certificate of Compliance	9-9
	9-1.5F Concrete Pipe Acceptance Report	9-10
	9-1.5G Sign Fabrication Inspection	9-10
	9-1.5H Catalog Cuts	9-11
9-1.6	Control of Materials	9-11
<hr/>		
9-2	Vacant	9-11
<hr/>		
9-3	Vacant	9-11
<hr/>		
9-4	Specific Requirements for Each Material	9-11
9-4.1	Portland Cement or Blended Hydraulic Cement	9-12
9-4.2	Bituminous Materials	9-12
9-4.3	Hot Melt Traffic Button Adhesive	9-13
9-4.4	Concrete Aggregates	9-13
9-4.5	Surfacing Aggregates (Crushed Screening, Crushed Cover Stone, Ballast, Shoulder Ballast, Crushed Surfacing Base and Top Course)	9-14
9-4.6	Aggregates for Hot Mix Asphalt (HMA) and Asphalt Treated Base	9-14
9-4.7	Hot Mix Asphalt (HMA) and Asphalt Treated Base	9-15
9-4.8	Mineral Filler	9-15
9-4.9	Gravel Base and Bank Run Gravel for Trench Backfill	9-15
9-4.10	Pit Run Aggregates (Gravel Backfill for Foundation CL. B, Walls, Pipe Zone Bedding, Drains and Drywells; Backfill for Sand Drains, Sand Drainage Blanket, Bedding Material for Rigid Pipe, Thermoplastic Pipe; Foundation Material Class A, B, and C, Gravel Borrow, Common Borrow, Select Borrow)	9-16
9-4.11	Vacant	9-16
9-4.12	Premolded Joint Filler for Expansion Joints	9-16
9-4.13	Elastomeric Expansion Joint Seals	9-16
9-4.14	Two Component Poured Rubber Joint Sealer	9-16
9-4.15	Hot Poured Joint Sealant	9-17
9-4.16	Concrete Culvert, Sewer, Drain, and Underdrain Pipe	9-17
9-4.17	Galvanized Steel, Pipe Arch, Aluminized Steel and Aluminum Corrugated Metal Culvert, Drain Pipe and Perforated Underdrain Pipe	9-17
9-4.18	Perforated Underdrain Pipe	9-18

9-4.19	Structural Plate Pipes and Arches	9-18
9-4.20	Gray-Iron Castings, Steel Castings, Ductile-Iron Castings (Catch Basin Frames and Grates, Manhole Rings and Covers, Monument Case and Cover, etc.)	9-18
9-4.21	Sanitary Sewers	9-19
9-4.22	Steel for Bridges	9-19
9-4.23	Unfinished Bolts (Ordinary Machine Bolts), Nuts, and Washers	9-20
9-4.24	High Strength Bolts, Nuts and Washers	9-20
9-4.25	Anchor Bolts	9-20
9-4.26	Reinforcing Bars for Concrete	9-20
9-4.27	Epoxy Coated Reinforcing Steel Bars for Concrete	9-21
9-4.28	Mechanical Splices	9-21
9-4.29	Rebar Chairs, Dobies, and Spacers	9-21
9-4.30	Dowels and Tiebars for Concrete Pavement, incl. Epoxy Coated	9-21
9-4.31	Wire Reinforcement for Concrete	9-22
9-4.32	Bridge Approach Slab Anchors	9-22
9-4.33	Prestressing/Post Tensioning Reinforcement — Strand	9-22
9-4.34	Prestressing/Post Tensioning Reinforcement — Bar	9-22
9-4.35	Paints for Structures	9-23
9-4.36	Timber and Lumber — Untreated	9-23
9-4.37	Treated Timber and Piling	9-23
9-4.38	Timber Piling — Untreated	9-24
9-4.39	Steel Piling All Types	9-24
9-4.40	Coated Steel Piling	9-24
9-4.41	Precast Concrete Catch Basins, Manholes, and Inlets	9-24
9-4.42	Riprap, Quarry Spalls, Slope Protection, and Rock for Rock Wall	9-24
9-4.43	Semi-Open Slope Protection	9-25
9-4.44	Plant Material	9-25
9-4.45	Topsoil Type A	9-25
9-4.46	Seed	9-25
9-4.47	Fertilizer	9-26
9-4.48	Mulch	9-26
9-4.49	Irrigation System	9-26
9-4.50	Fencing	9-27
9-4.51	Beam Guardrail, Guardrail Anchors, and Glare Screen	9-27
9-4.52	Guardrail Posts and Blocks	9-27
9-4.53	Miscellaneous Precast Concrete Products (Block Traffic Curb, Precast Traffic Curb)	9-28
9-4.54	Prestressed Concrete Products	9-28
9-4.55	Raised Pavement Markers, Types 1, 2, and 3	9-28
9-4.56	Signing Materials	9-29
9-4.57	Concrete Curing Compounds	9-29
9-4.58	Admixtures for Concrete	9-29
9-4.59	Plastic Waterstop	9-30
9-4.60	Epoxy Systems	9-30
9-4.61	Resin Bonded Anchors	9-30
9-4.62	Gabion Baskets	9-31
9-4.63	Sign Structures	9-31
9-4.64	Conduit	9-31
9-4.65	Electrical Conductors	9-31
9-4.66	Signal, Luminaire, ITS, and Strain Poles	9-32
9-4.67	Anchor Bolts for Luminaire, Signal Poles, and Sign Structures	9-32
9-4.68	Luminaires and Lamps	9-32
9-4.69	Water Distribution System	9-33
9-4.70	Elastomeric Bearing Pads	9-33
9-4.71	Fabric Bearing Pad	9-33

9-4.72	Precast Concrete Barrier and Wall Panels	9-33
9-4.73	Safety Bars, Cattle Guards, Sign Mounting Brackets, Steel and Special Guardrail Posts, Steel Sign Posts	9-34
9-4.74	Metal Bridge Rail	9-34
9-4.75	Construction Geotextiles	9-34
9-4.76	Concrete	9-35
9-4.77	Water for Concrete	9-35
9-4.78	Expansion Joints	9-35
9-4.79	Controller Cabinet Assembly	9-36
9-4.80	Miscellaneous Temporary Erosion and Sediment Control Items	9-36
9-4.81	Concrete Patching Material	9-36
<hr/>		
9-5	Guidelines for Job Site Control of Materials	9-37
9-5.1	General	9-37
9-5.2	Sampling and Testing Schedule	9-37
9-5.2A	General	9-37
9-5.2B	Reducing Frequency of Testing	9-37
9-5.2C	Sampling and Testing for Small Quantities of Materials	9-37
9-5.2D	Reference Test Report	9-37
9-5.3	Point of Acceptance	9-38
9-5.4	Basis for Acceptance	9-38
9-5.4A	Basis for Acceptance — Statistical Evaluation	9-38
9-5.4B	Basis for Acceptance — Non-Statistical Evaluation	9-38
9-5.4C	Basis for Acceptance — Asphalt Binder	9-38
9-5.4D	Basis for Acceptance — Other Aggregate Properties	9-39
9-5.5	Testing Staff Qualifications and Independent Assurance Program	9-39
9-5.5A	Testing Staff Qualification	9-39
9-5.5A(1)	General	9-39
9-5.5A(2)	Construction Tester Qualification Rules	9-39
9-5.5A(3)	Personnel Qualification Policy	9-41
9-5.5A(4)	Laboratory Qualifications Policy	9-41
9-5.5A(5)	Construction Tester Qualification Program	9-41
9-5.5A(6)	Regional Materials Laboratory Responsibilities	9-42
9-5.5A(7)	Project Engineer Responsibilities	9-42
9-5.5A(8)	The State Materials Laboratory Responsibilities	9-42
9-5.5A(9)	Tester Performance Review	9-43
9-5.5A(10)	Review Actions for Unsatisfactory Performance	9-43
9-5.5B	Independent Assurance (IA) Program	9-43
9-5.5B(1)	General	9-43
9-5.5B(2)	Independent Assurance Inspector (IAI)	9-43
9-5.5B(3)	Independent Assurance Evaluations	9-44
9-5.5B(4)	Evaluation of Independent Assurance Samples Testing	9-44
9-5.5B(5)	Comparison of Independent Assurance and Acceptance Test Results	9-44
9-5.6	Tolerance Limits	9-46
9-5.7	Acceptance Sampling and Testing Frequency Guide	9-51

9-1 General

9-1.1 Introduction

The quality of material used on the project will be evaluated and accepted in various ways, whether by testing of samples, visual inspection, or certification of compliance. This chapter details the manner in which these materials can be accepted.

9-1.2 Requirements

Requirements for materials are described in Section 1-06 and Division 9 of the *Standard Specifications for Road, Bridge and Municipal Construction* (M 41-10). Tolerance limits and a procedure for acceptance of certain materials are given in Chapters 9-5.4 and 9-5.6. For inspection of course thickness, the maximum deviations for measured thickness of surfacing and paving see Chapter 1-6 of this manual.

9-1.3 Sample and Test Numbering

A separate series of numbers, starting with No. 1 in each instance, shall be used for acceptance, independent assurance, and verification samples for each type of material for which there is a separate bid item. Verification samples shall be referenced to the corresponding Manufacturer's Certificate of Compliance.

9-1.3A Preliminary Samples and Tests

Preliminary samples are intended to show the general character of the materials available or proposed for use. The sample may be taken from a natural deposit, the general stock of a dealer, or elsewhere. The material sampled may require further treatment before it will meet the specification requirements. Preliminary samples are a basis for approving which aggregate site or brand of material will be considered for use. Deliveries cannot be accepted on the basis of preliminary samples unless the samples represent an identified lot of materials.

Unless specified for a particular purpose, preliminary sampling and testing of materials from a potential source are not mandatory functions. It is to be performed when requested by the Project Engineer, Region Materials Engineer or the State Materials Laboratory on the Request for Approval of Material (DOT Form 350-071).

For aggregate sources that have been identified as having variable quality, contact the Regional Materials Engineer prior to use. It has been demonstrated that some of these sources can provide quality material through diligent production and stockpile management. The Regional Materials Engineer may approve these aggregate sources by the stockpile(s) or on a project-by-project basis. To determine aggregate approval status, consult the 'Aggregate Source Approval Report' generated from the ASA database prior to use.

In order to insure consistency in sampling of aggregate sources for preliminary testing, the sampling must be witnessed or taken by a designated representative of the Regional Materials Engineer.

Before sampling, check to see if the source that is proposed is currently approved for the intended use. If current preliminary test reports are available and confirm that the material meets the contract requirements, additional tests may not be needed. If in doubt, contact the State Materials Laboratory for assistance.

9-1.3B Acceptance Samples and Tests

Acceptance samples and tests are defined as those samples tested for determining the quality, acceptability, and workmanship of the materials prior to incorporating the materials into the project. The results of these tests are used to determine conformance to the contract documents. The minimum frequency for sampling and testing of acceptance samples is detailed in Chapter 9-5.7 of this manual.

9-1.3C Vacant

9-1.3D Verification Samples and Tests

Verification samples and tests are used for making checks on the reliability of a manufacturer's test results when acceptance of the material is based upon a Manufacturer's Certificate of Compliance.

9-1.4 Form Letters

A number of form letters have been prepared as an aid to the Project Engineer in transmitting information to the laboratory. In order to minimize delays to completion of material testing, transmittal letters should include all the information that is pertinent to the sample in question. In order to assist the laboratory, copies of the transmittal letters should be retained in the Project Engineers Office. The following is a list of the forms that may be used for transmittal of samples and/or information to the materials laboratory:

- 350-009 Concrete Test Cylinder Transmittal Letter
- 350-016 Asphalt Sample Label
- 350-026 Preliminary Sample Transmittal Letter
- 350-040 Proposed Mix Design
- 350-056 Sample Transmittal
- 350-071 Request for Approval of Material
- 350-074 Field Density Test
- 350-092 Hot Mix Asphalt Compaction Control Report
- 350-114 Summary Report of Acceptance Sampling and Testing
- 350-115 Contract Materials Checklist
- 351-015 Daily Compaction Test Report
- 410-025 Transmittal of Falsework, Form and Shop Drawings

9-1.5 Project Material Certification

The Project Engineer is responsible for obtaining all required materials documentation or otherwise ensuring that all required materials testing is completed, all with satisfactory results, prior to the materials being incorporated into the project. The Project Engineer is also responsible for maintaining a successful accounting for the materials

incorporated into the project in order to support the Region's Certification of Materials. Management and accounting for materials used in the construction of a project are to be administered in the same manner regardless of its funding source; Federal, State, or a combination of both.

The Region is responsible for periodic reviews of each project's materials documentation at the Project Engineer's office. Upon completion of the project the Region will prepare a Region Materials Certification letter listing all variances that were identified and their resolution. On projects that involve Federal participation where material deficiencies are documented, these deficiencies must be resolved with the State Construction Office through the Region before the Region Certification of Materials can be completed. On projects that involve State Funds only, documented deficiencies must be resolved with the Region prior to the Region Certification of Materials. The Regional Administrator or their designee is responsible for signing and distributing the certification letter.

The State Materials Laboratory will also perform compliance reviews on a sampling of completed projects statewide where the materials have been certified.

Definitions

Certification: A Region Materials Certification based on a documented evaluation of the project's materials inspection, sampling, testing, and other materials acceptance activities for their conformance to the contract documents, *Standard Specifications* and this manual. The certification reflects the project's conformance with the Record of Materials as adjusted by the Project Engineer for:

1. Actual project quantities utilized,
2. Acceptance practices as provided for in this manual, including Chapters 1-2.8 and 9-5.2, and Non-critical items,
3. Adjusted sampling/testing frequencies as provided for in Chapter in 9-5.2, and
4. Work added by Change Order.

Variance: An identified difference between the materials acceptance requirements noted in this manual, the contract documents, the *Standard Specifications*, and a review of the completed projects Record of Materials. All variances must be noted. Such notations will need to include the basis by which the material was accepted and how the requirements for that material were met. Any variance between the recognized acceptance requirements and the Project Engineer's use of the material must be resolved with either the Region, State Construction Office, and/or State Materials Laboratory, as appropriate.

Project Material Certification Process

Environmental and Engineering Programs Division (EPPD)

1. State Materials Laboratory (Documentation Section)
 - a. Prepare the initial Record of Material for all major items of materials listed in the contract.

- b. Provide technical support, certification guidelines, format, and suggested documents. See Figure 9-1 for Project Materials Checklist (DOT Form 350-115, latest version). See Figure 9-2 for examples of the Region Materials Certification letter and its distribution.

- c. Conduct Compliance Reviews on a sampling of completed projects statewide where the Region has certified the materials.

2. The State Construction Office

- a. Receives variances for federal aid projects identified during the Region's materials certification review.

- b. Coordinates FHWA and Region to determine funding eligibility for variances.

- c. Prepares response to Region identifying degree of participation (Letter of Resolution).

3. Accounting Office

- a. The federal aid section will make the appropriate transaction as necessary upon receipt of the Letter of Resolution.

- b. Voucher a federal project only after receiving a copy of the Project Materials Certification, the Letter of Resolution and assure that the appropriate credit has been made to FHWA.

- c. Attach a copy of the Letter of Resolution to the Journal Voucher sent to FHWA.

Region

1. Project Engineer

- a. Sets up and maintains a materials documentation system.

- b. Maintains and monitors a current Record of Material ensuring materials certification throughout the course of the project.

- c. Identify, document, and justify all materials variances including determination and acceptance of noncritical items in accordance with Chapter 1-2.8 of this manual. Justification may be any of the following:

1. Follow requirements of Section 1-2.8C(3) if the deficiency is a lack of manufacturer's certification.

2. Satisfy the deficiency through additional testing or documentation.

3. Demonstration that the existing documentation is adequate (for example, 19 out of 20 test were taken).

4. Demonstration that the cost of obtaining the missing documentation will not be justified by the benefits received.

- d. Identify and document the determination and acceptance of all non-critical items in accordance with Section 1.2-8A of this Manual.



**Washington State
Department of Transportation**

Contract Materials Checklist

Contract Number	Sign Route	Federal Aid Number(s)			
Project Title					
		Yes	No*	N/A	Item No(s).
1. All materials/products used in the construction of this project, including items added by Change Order, have been approved & are listed on the Record of Materials.			**		
2. The actual materials/products used along with the actual basis for acceptance of those materials and products has been documented.			**		
3. All uses of proprietary items, including those listed in the Special Provisions and/or contractor provided QPL items, are documented.					
4. When required, change of material/product letters and a revised RAM were initiated by the contractor.					
5. A Change Order has been completed for all materials accepted and incorporated into the project, but which failed to meet the required specifications when tested.			**		
6. An appropriate credit has been received for all non-specification materials used.			**		
7. Modifications to testing/inspection procedures, including CM 1-2.8A, have been explained and documented by the Project Engineer prior to construction of the item.					
8. Acceptance based on Sampling and Testing for Small Quantities has been documented. CM Chapter 9-5.2C.					
9. Where Manufacturers Certifications were not provided prior to material or product installation, the Project Engineer has provided specific prior approval for the work to continue in accordance with 1-06.3 of the Standard Specifications.					
10. All required acceptance actions and documentation were completed and satisfactory test results demonstrated before payment was made on each item.					
11. Acceptance sampling & testing frequencies for each item accepted is adequate for the total quantities of those items incorporated into the project.			**		
12. All Acceptance Sampling and Testing completed by the Project Engineer utilized Qualified Testers and Certified Testing Equipment in accordance with the Qualified Tester program.					
13. All fabrication inspected items have been accepted in accordance with CM 9-1.5D			**		
14. The contractor has submitted all required Manufacturer Certifications and Mill Certifications, the Certifications represent the specification requirements noted in the contract, and quantities represented by the certifications match or exceed the final quantities used.			**		
15. All required catalog cuts have been approved and are on file.			**		
16. All required Certificates of Materials Origin have been received and are on file. (Fed Aid projects only)			**		
<p>* Checklist items marked "No" constitute a Materials Certification deficiency. Each "No" requires the contract item number for the affected item to be shown along with an attachment to the Materials Checklist detailing the circumstances of use, the method used for acceptance of the material, the Project Engineer's evaluation of the material, suitability for it's application, and determination as to whether or not it may have met the specification in spite of the materials documentation oversight. If the project is Federally funded, the Project Engineer should also include a recommendation for Federal participation in light of the use of undocumented materials.</p> <p>** These specific materials deficiencies on Federal Aid projects must be resolved through State Construction Office and may result in the loss of Federal participation.</p>					
_____		_____		_____	
Project Engineer		Date			
_____		_____		_____	
Region Construction Engineer/Operations Engineer/Area Engineering Manager		Date			

DOT Form 350-115 EF
Revised 3/2002

Figure 9-1



Washington State
Department of Transportation

Memorandum

Linea Laird, P.E.
State Construction Engineer
P.O. Box 47354
Olympia, WA 98504-7354
MS: 47354

Cont. No.: SR-
F.A. No:
Section:

Date Completed:

Dear Linea:

This is to certify that:

The results of acceptance sampling and testing completed for the project referenced above, confirm that the materials incorporated into the project were found to have met the requirements as outlined in the contract plans, provisions, and Standard Specifications.

There were no exceptions

OR:

This is to certify that:

The results of the tests on acceptance samples indicate that the material incorporated in the construction operations controlled by sampling and testing were in conformance with the approved plans and specifications.

Exceptions to the plan and specifications are explained on the attached sheet(s).

Very truly yours,

Regional Administrator or designee

XX:xx
Attachment:

cc: FHWA, 40943 (F.A. Projects Only)
State Materials Engineer, 47365
Regional Oper./Const. Engineer
Project Engineer

DOT Form 700-008 EF
Revised 5/99

Figure 9-2

- e. Prepares the Region Materials Certification package, which includes the Region Materials Certification letter, identified variances, Letters of Resolution for all identified variances on federal aid projects and resolution actions taken. This package also includes a completed Contract Materials Checklist (DOT Form 350-115). The certification package is submitted to the Region Construction Manager for review. The certification letter is to be addressed to the State Construction Engineer.
2. Regional Operations/Construction Office
 - a. The Region shall review projects according to Chapter 10-5 of this manual for documentation requirements including materials.
 - b. Resolve materials variances identified by the Project Engineer and the Region's review of materials documentation at the Region level for State funds only projects. Resolve materials variances on Federal aid projects through contact with the State Construction Office.
 - c. Review certification package for completeness.
 - d. Submit certification letter to Regional Administrator for signature.
 - e. Distribute signed Region Materials Certification letter. The original is submitted to the State Construction Engineer, with copies sent to FHWA (for F.A. Projects) and the State Materials Engineer. A copy of the Letter of Resolution shall be attached if there are any variances.
 3. Regional Administrator, or designee
 - a. Signs the certification letter.
 4. State Construction Administration and Support Accounting Office
 - a. Completes the necessary paperwork.

Compliance Review for Materials Certification Process

Compliance reviews will be performed by the State Materials Laboratory to document how well project records conform to materials certification standards. Upon receipt of a completed Region Materials Certification letter from the Regional Operations/Construction Office, the State Materials Laboratory will notify the Region within 60 days of intent to perform a compliance review on that project. If the project is selected for a compliance review, it will be scheduled within 180 days of notification to the Project Office.

The compliance review will normally be conducted at the project office unless arrangements are made for it to be conducted elsewhere.

The goal is to perform a compliance review on at least one project per project office every two years. Compliance reviews may be conducted more frequently as appropriate. Projects will be selected with consideration given to project size and complexity.

The records maintained and developed by the Project Engineer for acceptance of the materials and the identification of variances will be reviewed.

Upon completion of the review, the findings will be discussed with the Project Engineer and/or his representative. A report of the findings will be prepared and sent to the Project Engineer within 60 days after the review. A copy will be sent to the Regional Documentation Engineer, Construction Manager, State Construction Office, and the FHWA Division Office.

If the Compliance Review shows a discrepancy of a serious nature, the Construction Manager will correct any such discrepancy in the process.

The following items of documentation are required to develop the Material Certification and must be made available for review:

1. Record of Materials, as revised and amended by the Project Engineer (ref. 9-1.5A)
2. Request for Approval of Material (ref. 9-1.5B)
3. Comparison of Quantities (Region Final)
4. List of Change Orders
5. Reduced Frequency Testing Approval
6. Test Results
 - a. Acceptance Test Reports
 - b. Assurance Test Reports (where applicable)
 - c. Independent Assurance Test Reports (where applicable)
 - d. Verification Test Reports (Cement and Liquid Asphalt)
7. Manufacturer's Certificate of Compliance (ref. 9-1.5E)
 - a. Concrete Pipe Acceptance Report (ref. 9-1.5F)
 - b. Lumber Grading Certificate
 - c. Certification of Cement Shipment
 - d. Notice of Asphalt Shipment or Certified Bill of Lading
 - e. Any other certificate required by the contract documents
8. Inspected Items Acceptance (ref. 9-1.5D)
9. Catalog Cuts (Product Data Sheet)
10. Small Quantity Acceptance Documentation
11. Proprietary or Qualified Products List (QPL) Item Acceptance Documentation (ref. 9-1.5B)
12. Sign Acceptance Report (ref. 9-1.5G)
13. Field Acceptance Reports, Field Note Records, and/or Inspectors Daily Reports
14. Follow-up actions for excessive variations between the Acceptance Sample and the Independent Insurance Sample Test Results (when applicable)

9-1.5A Record of Materials (ROM)

A Record of Materials (ROM) listing of all major construction items is provided by the State Materials Laboratory for each project. For these major construction items, the ROM identifies the kinds and quantities for all materials deemed to require quality control testing. It further identifies the minimum number of acceptance and verification samples that would be required for acceptance of those materials. The minimum number of acceptance tests is based on the planned quantities for the project and should be adjusted for the actual quantities used. Also listed are those materials requiring other actions, such as fabrication inspection, Manufacturer's Certificate of Compliance, shop drawings, or catalog cuts.

The acceptance action and/or numbers of samples listed are the minimum requirements for the Project Engineer's acceptance of those materials and the minimum requirements necessary for the Region's certification for the materials used on that project. The State Materials Laboratory will forward the Record of Materials electronically to the Regional Materials Engineer, and Project Engineer shortly after the contract is awarded. The copy submitted to the Project Engineer is intended as a tool to assist the project office in tracking the samples approved, samples tested, Manufacturer's Certificate of Compliance, shop drawings, catalog cuts received, and other pertinent data necessary for the Project Engineers and the Regions certification of materials.

The acceptance requirements shown on the Record of Material may be modified by the Contractors specific Requests for Approval of Material. In addition the ROM is based on the State Material Laboratory's review of the major items of construction identified by the contract Summary of Quantities. Reviewing the contract plans and provisions may also identify additional materials documentation requirements as well as major construction items that require additional materials not accounted for in the State Material Laboratory's initial review of the project. These additional materials documentation requirements should be added to the ROM and tracked for completion throughout the course of the project work.

The accuracy of the ROM and Certification of Materials is largely the responsibility of the Project Engineer.

Where the ROM is not clear or there appear to be opportunities to adjust the acceptance requirements that have been identified, the Project Engineer is encouraged to contact the Region Materials Engineer or the State Materials Laboratory for assistance.

In order to ensure clarity upon completion of the work and to allow for easy certification of the project by both the Project Engineer and the Region, it is important that the project ROM be accurate and actively maintained throughout the course of the project. Any changes to the acceptance requirements, additional materials used, or any additional materials added to the project by change order should be accurately documented and tracked in the project Record of Materials.

9-1.5B Approval of Materials

To fulfill the requirements of *Standard Specifications* Section 1-06.1, the Contractor must notify the Engineer of all proposed permanently incorporated materials prior to use. This may be accomplished by a Qualified Product List (QPL) submittal or by submitting a Request for Approval of Material (RAM) (DOT Form 350-071). Approval of the material does not necessarily constitute acceptance of materials for incorporating into the work. Additional acceptance actions, as noted by the code on the RAM or QPL must be completed prior to the material being used in the work.

Where the Contract Documents list products by specific name and model, and for which no additional requirements are stated (proprietary products) or is listed as Contracting Agency Supplied Materials, the Contractor needs only to complete the RAM indicating to the Engineer the intended choice. The Engineer shall approve the RAM, noting the page number where it is listed in the Contract Documents as a proprietary product or Contracting Agency Supplied material.

Qualified Products List — Submittals

Products listed in the QPL have been found capable of meeting the requirements of the *Standard Specification* or General Special Provision under which they are listed and, therefore, have been "Approved." These may be "Accepted" by fulfilling the requirements of the Acceptance Code and any notes that apply to the product. Instructions are given in the QPL for processing QPL submittals. The Engineer shall review the submittal of the material for consistency with the Bid Item and shall promptly notify the Contractor of any concerns, working toward resolving these with the Contractor. QPL submittals inconsistent with the intended use for the Bid Item should be marked "unacceptable for intended use" and returned to the Contractor.

Request for Approval of Material — Submittals

Requests for materials not included in the QPL shall be submitted using the RAM form. Aggregate Sources will be approved by consulting the Aggregate Source Approval database for the use intended. Fabrication Facilities, Nurseries, and Concrete Batch Plant approvals will be determined by the use of other reference databases.

The Engineer may use the QPL as a reference source for coding products submitted on a RAM. The specific product listed on the RAM must be identified by make, model, batch, color, size, part no., etc. and correspond exactly to the approved QPL product. The product must also be listed in the QPL under the appropriate *Standard Specification* for the intended use as indicated by the Bid Item and Specification Reference shown on the RAM. The RAM should be coded with the 4-digit QPL code and any notes and/or restrictions restated as "Remarks" on the RAM.

When unable to approve a RAM as outlined above, the Engineer will code the items with a "7" and forward it to the State Materials Laboratory Documentation Section. The RAM may be forwarded by mailing, electronically transferring or faxing. A signed and dated copy should also be returned to the Contractor at this point to inform him that

the RAM has been sent to the State Materials Laboratory for approval. Submit any additional documentation, along with appropriate transmittals, that may assist the RAM Engineer in approving the proposed material; such as Catalog Cuts, Manufacturer's Certificate of Compliance, etc. Including the page number of the Special Provision or Plan Sheet will also aid in expediting the Approval process.

All RAMs shall be signed and dated by the Engineer. Copies shall be distributed as indicated at the bottom of the form. Acceptance requirements should be noted on the maintained ROM or Materials Tracking Program. When additional material documentation such as Manufacturer's Certificate of Compliance or Catalog Cuts are available, copies may be made to assist the Inspector in the acceptance/verification process.

When noted on the State approved RAM, copies of requested material documentation (i.e., Manufacturer's Certificate of Compliance, Mill Test Reports, Catalog Cuts, etc.) should be sent to the State Materials Laboratory, QPL Engineer, for possible inclusion on the QPL.

Low Risk Materials

There are low risk materials that may be used in the project without contractor identification per Section 1-06 of the *Standard Specifications* or any other documentation. The following is a listing of these materials. Other items can be considered for addition to this list. We encourage anyone with suggestions to contact the Construction Office or the State Materials Laboratory.

- Electrical tape, friction tape, and Moisture proof varnish for friction tape
- Duct tape for bridge approach slab anchors
- Galvanized wire mesh and hardware for screens on sign bridges and cantilever sign structure bases
- Grout for cosmetic purposes
- Nails
- Pea gravel for decorative purposes
- Pipe wrap and spacers for electrical conduit
- Polypropylene rope for induction loop centralizers
- Premolded joint filler for expansion joints in sidewalks
- PVC glue
- Spacers for rebar columns
- Straw bales not used as mulch
- Silicone sealant for electrical service cabinets

9-1.5C Field Verification of Materials

All materials permanently incorporated into a contract shall be field verified and documented by the inspector. The field verification or visual inspection shall occur prior to or during placement of materials by means of a note in the Inspector's Daily Report (IDR), a note added to the Field Note Record, a completed Field Acceptance Report, by completing the QPL page, or notes kept in a pocket notebook or other form

developed by the PE office. Field verification documentation should contain sufficient information to identify what was used including manufacturer and/or source, product identity, quantities, Fabrication Inspection information and retainage of additional documentation if required per the contract documents. The field verification documentation needs to be initialed or signed and dated by the inspector at the time of verification. The field verification information should be the link between what was placed and paid for to what was approved on the RAM or QPL and its proper acceptance criteria.

Material that has acceptance criteria of 'visual inspection' only requires that the field inspector sign and date the Field Note Record representing each pay quantity identified. When the project inspector signs/initials the FNR for payment, they are also affirming that items requiring visual inspection have been checked and have been found to be acceptable. All other forms of acceptance criteria require normal Field Verification documentation per this section.

If the Field Note Record is used for field verification, the materials documentation on the record has to be adequate to verify what was used and approved. For lump sum or large items of work, it may necessitate the field inspector to 'field verify', sign, and date the Field Note Record more than once over the duration of the work on the bid item. This would show that each 'component' of the bid item was verified prior to or during the time it was placed.

For DOT fabrication inspected items, the field verification required is the quantity, the Tag/Stamp ID number, and Materials Origin, Foreign or Domestic (F or D) designation.

For signs, the field verification shall document the quantity, and a notation that all signs had the WSDOT inspected decal. The field inspector will need to document that the sign mounting hardware package supplied by the sign fabrication facility bears a "WSDOT INSPECTED" stamp, is 'sealed' and the contains either a Materials Origin F or D.

Field Verification for Traffic Control Cabinet will be by a passing test report and the documentation of the date and name of the region electrical inspector approving the cabinet for turn on. Field Verification for Electrical Service Cabinet will be the documentation of the date and name of the region electrical inspector approving the "turn on".

9-1.5D Materials Fabrication Inspection Office — Inspected Items Acceptance

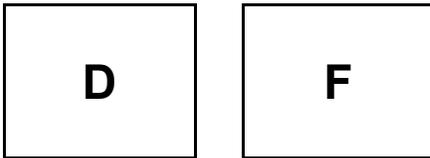
Items that are inspected and found to meet contract documents by the Materials Fabrication Inspection Office are identified by a tag or stamp. This type of inspection is generally performed at the manufacturing or fabrication plants. There are various types of stamps or tags used for acceptance of inspected items, which attest that the item was in full conformance with the specifications at the time of inspection. The inspected items along with the type of stamp designation is covered under Section 9-1.5D(1) of this manual.

The following is the process for the acceptance of inspected items.

1. The manufacturing or fabrication plant must be approved via the "Request for Approval of Material," (RAM) or the *Qualified Products List* (QPL)
2. The Materials Fabrication Inspection Office Inspector, who will obtain the necessary mill tests or other documentation from the manufacturer and reference them to the stamp or tag shown in Figures 9-3 through 9-7, must inspect the item of work. This number can be used for tracking of the item.

Steel and iron items containing Foreign steel will be stamped with an "F" identifier, and steel and iron items that do not contain foreign steel will be stamped with a "D" identifier. See figure 3A and 3B. This stamp is in addition to the appropriate acceptance tag or stamp in figures 9-3, 9-4, 9-5, and 9-7. The "F" or "D" identifier will be stamped next to the acceptance stamp. For those items with an acceptance tag, the "F" or "D" stamp will be stamped on the back of the tag.

In all cases, the project office will be responsible for securing the Certificate of Material Origin and tracking the quantities.



Domestic or Foreign Identifier Stamp
Figure 3A and 3B

3. Once the fabricated item arrives on the job, check for approval stamp or tag.

a. If there is an approval stamp or tag, record the type of tag or stamp along with the ID number when applicable, quantity, and brief description of the item for project records. The Project Engineer's representative should note in a report that the material was in satisfactory visual condition when installed and forward all information to the project office. In case of questions concerning an inspected item, contact the appropriate Materials Fabrication Inspection Office. The offices are:

State Materials Laboratory, Tumwater,
Mail Stop 47365

Seattle Inspection Office, Mail Stop NB-82,
Northwest, MS-501

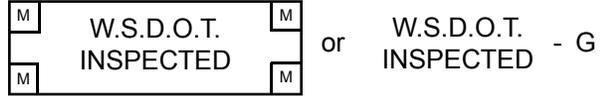
Spokane Inspection Office, Mail Stop Eastern,
Materials Lab

Vancouver Inspection Office, Mail Stop Southwest
S-15, Materials Lab

b. If there are no stamps or tags, inform the Contractor that the item may not be acceptable, and contact the Materials Fabrication Inspection Office to determine the status of the inspection. Items lacking tags or stamps or damaged during shipping should be rejected and tagged or marked appropriately.

9-1.5D(1) Inspected Items, Stamps and Tagging Identification

The following are examples of the types of stamps and tags used by the Materials Fabrication Inspection Office. The letter on the stamp or tag represents the inspector who performed the inspection.



Stamps
Figure 9-3

The stamps shown in Figure 9-3 identifies inspection and the inspector of the following items:

1. Precast Concrete Barrier
2. Precast Concrete Catch Basins, Manholes and Inlets. This includes all sections and risers 6 inch and above.
3. Concrete Utility Vaults
4. Concrete Junction Boxes
5. Galvanized Steel

All Documentation associated with these stamps in Figure 9-3 will be reviewed and approved by the Materials Fabrication Inspection Office and kept at the point of Manufacture, with the exception that they will not track the quantities of foreign materials used on the project. Steel items containing foreign steel will be stamped with an "F" identifier in addition to the appropriate stamp. Steel items that do not contain foreign steel will be stamped with a "D" identifier in addition to the appropriate stamp.

**APPROVED FOR SHIPMENT WASH. DEPT. TRANSP.
N001234**

Stamp
Figure 9-4

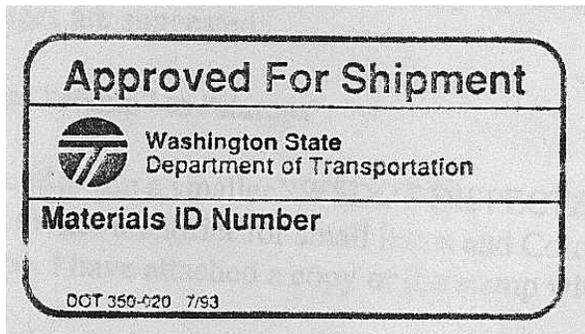


Tag
Figure 9-5

The stamp shown in Figure 9-4 or tag shown in Figure 9-5 identifies inspection and the inspector of the following items:

1. Concrete Wall Panels — Stamped or tagged
2. Three Sided Structures — Stamped or tagged
3. Prestressed Concrete Products — Stamped or tagged
4. Steel for Bridges — Stamped or tagged
5. Signal, Luminaire, ITS and Strain Poles — Stamped or tagged
6. Miscellaneous Welded Shop Items (see RAM or QPL for special items) — Stamped or tagged
7. Sign Structures and associated hardware — Stamped or tagged
8. Anchor Bolts for Luminaires, Signal Poles and Sign Structures — A representative number of bolts shall be stamped with the inspector's I.D. # and the shipment will be accompanied by an "Approved for Shipment Tag".
9. Epoxy Coated Reinforcing Steel Bars for Concrete — Representative bundles of rebar shall be tagged per shipment to the project
10. Metal Bridge Rail — Each bundle of rail shall be tagged
11. Concrete Culvert, Sewer Pipe (30 inches and above) — Stamped
13. Sign Mounting Hardware — stamp

All Documentation associated with the stamp in Figure 9-4 or the tag in Figure 9-5 will be reviewed and approved by the Materials Fabrication Inspection Office and kept at the Materials Fabrication Inspection Office, with the exception that they will not track the quantities of foreign materials used on the project. Steel items containing foreign steel will be stamped with an "F" identifier in addition to the appropriate stamp. Steel items that do not contain foreign steel will be stamped with a "D" identifier in addition to the appropriate stamp.



Tag
Figure 9-6

The tag in Figure 9-6 identifies inspection and inspector of Treated Timber, Piling and Poles

1. Bundles of treated timber may be randomly tagged "Approved for Shipment" referencing the inspector's identification number.
2. Treated Piling and Poles shall be individually tagged "Approved for Shipment" referencing the inspector's identification number.

All Documentation associated with the tag in Figure 9-6 will be reviewed and approved by the Materials Fabrication Inspection Office and kept at the Materials Fabrication Inspection Office.

WSDOT-A

Stamp Figure 9-7

The stamp shown in Figure 9-7 identifies inspection and inspector of the following items:

(This stamp is impressed on the casting and will be circled with spray paint for ease of visibility of the stamp.)

1. Gray-Iron Castings, Steel Castings, Ductile-Iron Castings — Stamped
2. Rectangular Frames and Grates — Each set shall be stamped aligning the adjacent mating surfaces to each other. This alignment is critical as the leveling pads are ground to prevent rocking of the grates in the frames.

All Documentation associated with the stamp in Figure 9-7 will be reviewed and approved by the Materials Fabrication Inspection Office and kept at the Materials Fabrication Inspection Office, with the exception that they will not track the quantities of foreign materials used on the project. Steel and Iron items containing foreign steel will be stamped with an "F" identifier in addition to the appropriate tag or stamp. Steel and Iron items made entirely of domestic steel and iron will be stamped with a "D".

9-1.5E Manufacturer's Certificate of Compliance

As designated by the specifications and contract special provisions, certain materials may be accepted on the basis of a Manufacturer's Certificate of Compliance. This acceptance is an alternate to job site sampling and testing. The Record of Material should indicate the required sampling and testing and provide a guide to the items for which a compliance certification is an acceptable basis of acceptance. The Manufacturer's Certificate of Compliance is required prior to installation of the material. See Section 1-2.8C(3) of this manual for guidance on allowing material to be placed without certification.

Acceptance by Manufacturer's Certificate of Compliance will be permitted where designated by the contract documents. The Record of Material will provide a summary of requirements combining the special as well as general requirements of the contract.

The form of the Manufacturer's Certificate of Compliance will vary considerably based on both the material and the origin and may take the form of standard state certificate forms, individual letters from manufacturers, or overprints on bills of lading. Certain information is required and is designated by the specifications. This information includes the identity of the manufacturer, the type and quantity of material being certified, the applicable specifications being affirmed, and the signature of a responsible representative of the manufacturer. Supporting mill tests or documents may also be required. A Manufacturer's Certificate of Compliance is required for each delivery of material to the project and the lot number, where lot numbers apply, of material being certified shall be identified.

Upon receipt of the Manufacturer's Certificate of Compliance at the project office, it shall be reviewed for compliance with the specifications requirements using the preceding guidelines and the checklist for Transmittal of Manufacturer's Certificate of Compliance Form 350-572. The manufacturer of the material must make the certification. A supplier certificate is not acceptable except as evidence for lot number and quantity shipped and can only be accepted when accompanied by a certificate from the manufacturer, which meets the requirements of Section 1-06.3 of the *Standard Specifications*.

9-1.5F Concrete Pipe Acceptance Report

Fabrication inspection is periodically performed at approved sources of concrete pipe. During this inspection, samples of each type, size, and class of pipe are inspected and tested to verify compliance with the *Standard Specifications*. For a 90-day period of manufacture from the date of inspection, concrete pipe less than 30 inches diameter may be shipped and accepted based on "Concrete Pipe Acceptance Reports." This report is prepared by the Fabrication Inspector and copies are thereafter supplied by the fabricator to accompany each shipment of pipe.

The Acceptance Report will indicate the date and original test results as performed by the Fabrication Inspector and will bear appropriate certification from the fabricator. Verify the conformance of the shipment with the contract requirements and examine the manufacture and shipping dates of the pipe for conformance with specifications and with the Acceptance Report.

9-1.5G Sign Fabrication Inspection

The Sign Fabricator Inspector is to verify that signs for an individual contract were inspected and approved for shipment to the project by having a "FABRICATION APPROVED" decal, see Figure 9-8.



Figure 9-8

Pre-approval of the Sign Fabricator is required by Traffic Operations and /or the Materials Fabrication Office. The Sign Fabricator is approved via the Request for Approval of Material (DOT Form 350-071).

Sign Fabrication Inspectors

Seattle, Yakima, Tacoma, and other Western Washington area — Contact the State Materials Lab- Seattle Inspection Office, Mail Stop NB82-501, (206) 464-7770.

Vancouver-Portland area — Contact Vancouver Inspection Office, Mail Stop S15, (360) 905-2193.

Spokane-Eastern Washington area — Contact the Eastern Region Materials Lab, Spokane, (509) 324-6169

Sign Inspection documentation requirements:

1. **Sign blanks or panels:** Manufacturer's Certificate of Compliance with accompanying mill certifications will be kept at the Sign Fabrication facility.

2. **Reflective Sheeting and Cutout**

Legend: Manufacturer's Certificate of Compliance, this certificate will verify that the product(s) meets all the requirements of *Standard Specification 9-28.12*. The Manufacturer's Certificate of Compliance will be kept at the Sign Fabrication facility.

3. When sign mounting hardware is supplied by Sign Fabrication Facility, a Manufacturer's Certificate of Compliance is required to verify that the product(s) meet all the requirements of *Standard Specification 9-28.11*. The Manufacturer's Certificate of Compliance will be kept at the Sign Fabrication facility. For high strength sign mounting hardware supplied by the contractor, a certification will be required that shows the hardware meets *Standard Specification 9-28*. A 307 bolts, where allowed, will not require certification.

4. The Project Engineer Representative will accept for installation and payment only those signs which have a "FABRICATION APPROVED" decal affixed. The representative will also verify the sign mounting hardware package supplied by the sign fabrication facility bears a "WSDOT INSPECTED" stamp or that contractor supplied high strength mounting hardware for overhead and large multiple post roadside signs are certified to meet the

requirements of *Standard Specification* 9-28.11. In the event there is no “FABRICATION APPROVED” decal on the signs, or if the hardware does not have “WSDOT INSPECTED” stamp or Manufacturer’s Certificate of Compliance as described in section 3 above, they may be rejected. Contact the appropriate Sign Fabricator Inspector for status, or have the Contractor ship the signs back to Sign Fabricator, if this does not delay the project.

Double-faced signs, which do not receive decals, will be approved on visual inspection at the fabricator’s facility and in the field.

A list/invoice of all inspected and accepted signs will kept in the Sign Fabricator Inspector’s files.

9-1.5H Catalog Cuts

As designated by the contract documents, certain materials may require the acceptance criteria be based on a Catalog Cut. A Catalog Cut may also be required in support of approving a Request for Approval of Materials (RAM) per 9-1.5B. The approved Catalog Cut is required prior to installation of the material.

Upon receipt of the Catalog Cut information at the project office, an initial review for compliance with the established specifications and contract documents should be performed. All information shall be accompanied by the ‘Transmittal of Catalog Cuts’ form generated with the Record of Materials. The project office shall follow the directions on the ‘Transmittal of Catalog Cuts’ form and submit the package to the State Materials Lab Documentation Section for approval, or as per the original Record of Material. The ‘Transmittal of Catalog Cuts’ form and catalog cuts for those materials listed in Section 9-14 and 9-15 of the *Standard Specifications*, and accepted based on approved catalog cuts, should be submitted to the Region Landscape Architect or to the Landscape Liaison for approval.

The Catalog Cut may be forwarded by mailing, electronically transferring or faxing.

9-1.6 Control of Materials

The succeeding parts of this chapter on materials outline the detailed method to be used in the control of materials. The expenditure made for materials is a large item in construction costs. If faulty materials are permitted to be incorporated into the project, the cost of replacement may exceed the original cost.

Chapter 9-4, Specific Requirements for each type of material, includes the following information:

1. Approval of Material
2. Preliminary Samples
3. Acceptance Samples
4. Field Inspection
5. Specification Requirements

Chapter 9-5, Guidelines for Job Site Control of Materials, provides the Engineer with additional information to assist in determination of the point of acceptance for materials from

WSDOT and Contractor sources, the basis of acceptance, verification sampling and testing, tolerance limits, and the sampling and testing frequency guide.

Chapter 9-6, Radioactive Testing Devices, explains policy on the administration of radioactive testing devices.

Chapter 9-8, WSDOT Test Methods/Field Operating Procedures, are the testing procedures that are used in the field.

9-2 Vacant

9-3 Vacant

9-4 Specific Requirements for Each Material

Section Number	Specific Requirements for Each Material Alphabetical Listing	Page Number
9-4.58	Admixtures for Concrete	9-29
9-4.6	Aggregates for Hot Mix Asphalt (HMA) and Asphalt Treated Base	9-14
9-4.25	Anchor Bolts	9-20
9-4.67	Anchor Bolts for Luminaire, Signal Poles, and Sign Structures	9-32
9-4.51	Beam Guardrail, Guardrail Anchors, and Glare Screen	9-27
9-4.2	Bituminous Materials	9-12
9-4.32	Bridge Approach Slab Anchors	9-22
9-4.40	Coated Steel Piling	9-24
9-4.76	Concrete	9-35
9-4.4	Concrete Aggregates	9-13
9-4.16	Concrete Culvert, Sewer, Drain, and Underdrain Pipe	9-17
9-4.57	Concrete Curing Compounds	9-29
9-4.81	Concrete Patching Material	9-36
9-4.64	Conduit	9-31
9-4.75	Construction Geotextiles	9-34
9-4.79	Controller Cabinet Assembly	9-36
9-4.30	Dowels and Tiebars for Concrete Pavement, incl. Epoxy Coated	9-21
9-4.70	Elastomeric Bearing Pads	9-33
9-4.13	Elastomeric Expansion Joint Seals	9-16
9-4.65	Electrical Conductors	9-31
9-4.27	Epoxy Coated Reinforcing Steel Bars for Concrete	9-21
9-4.60	Epoxy Systems	9-30
9-4.78	Expansion Joints	9-35
9-4.71	Fabric Bearing Pad	9-33
9-4.50	Fencing	9-27
9-4.47	Fertilizer	9-26
9-4.62	Gabion Baskets	9-31
9-4.17	Galvanized Steel, Pipe Arch, Aluminized Steel and Aluminum Corrugated Metal Culvert, Drain Pipe and Perforated Underdrain Pipe	9-17
9-4.9	Gravel Base and Bank Run Gravel for Trench Backfill	9-15
9-4.20	Gray-Iron Castings, Steel Castings, Ductile-Iron Castings (Catch Basin Frames and Grates, Manhole Rings and Covers, Monument Case and Cover, etc.)	9-18

9-4.52	Guardrail Posts and Blocks	9-27	9-4.45	Topsoil Type A	9-25
9-4.24	High Strength Bolts, Nuts and Washers	9-20	9-4.37	Treated Timber and Piling	9-23
9-4.3	Hot Melt Traffic Button Adhesive	9-13	9-4.14	Two Component Poured Rubber Joint Sealer	9-16
9-4.7	Hot Mix Asphalt (HMA) and Asphalt Treated Base	9-15	9-4.23	Unfinished Bolts (Ordinary Machine Bolts), Nuts, and Washers	9-20
9-4.15	Hot Poured Joint Sealant	9-17	9-4.11	Vacant	9-16
9-4.49	Irrigation System	9-26	9-4.69	Water Distribution System	9-33
9-4.68	Luminaires and Lamps	9-32	9-4.77	Water for Concrete	9-35
9-4.28	Mechanical Splices	9-21	9-4.31	Wire Reinforcement for Concrete	9-22
9-4.74	Metal Bridge Rail	9-34			
9-4.8	Mineral Filler	9-15			
9-4.53	Miscellaneous Precast Concrete Products (Block Traffic Curb, Precast Traffic Curb)	9-28			
9-4.48	Mulch	9-26			
9-4.35	Paints for Structures	9-23			
9-4.18	Perforated Underdrain Pipe	9-18			
9-4.10	Pit Run Aggregates (Gravel Backfill for Foundation CL. B, Walls, Pipe Zone Bedding, Drains and Drywells; Backfill for Sand Drains, Sand Drainage Blanket, Bedding Material for Rigid Pipe, Thermoplastic Pipe; Foundation Material Class A, B, and C, Gravel Borrow, Common Borrow, Select Borrow)	9-16			
9-4.44	Plant Material	9-25			
9-4.59	Plastic Waterstop	9-30			
9-4.1	Portland Cement or Blended Hydraulic Cement	9-12			
9-4.72	Precast Concrete Barrier and Wall Panels	9-33			
9-4.41	Precast Concrete Catch Basins, Manholes, and Inlets	9-24			
9-4.12	Premolded Joint Filler for Expansion Joints	9-16			
9-4.54	Prestressed Concrete Products	9-28			
9-4.34	Prestressing/Post Tensioning Reinforcement — Bar	9-22			
9-4.33	Prestressing/Post Tensioning Reinforcement — Strand	9-22			
9-4.55	Raised Pavement Markers, Types 1, 2, and 3	9-28			
9-4.29	Rebar Chairs, Dobies, and Spacers	9-21			
9-4.26	Reinforcing Bars for Concrete	9-20			
9-4.61	Resin Bonded Anchors	9-30			
9-4.42	Riprap, Quarry Spalls, Slope Protection, and Rock for Rock Wall	9-24			
9-4.73	Safety Bars, Cattle Guards, Sign Mounting Brackets, Steel and Special Guardrail Posts, Steel Sign Posts	9-34			
9-4.21	Sanitary Sewers	9-19			
9-4.46	Seed	9-25			
9-4.43	Semi-Open Slope Protection	9-25			
9-4.63	Sign Structures	9-31			
9-4.66	Signal, Luminaire, ITS, and Strain Poles	9-32			
9-4.56	Signing Materials	9-29			
9-4.22	Steel for Bridges	9-19			
9-4.39	Steel Piling All Types	9-24			
9-4.19	Structural Plate Pipes and Arches	9-18			
9-4.5	Surfacing Aggregates (Crushed Screening, Crushed Cover Stone, Ballast, Shoulder Ballast, Crushed Surfacing Base and Top Course)	9-14			
9-4.80	Miscellaneous Temporary Erosion and Sediment Control Items	9-36			
9-4.36	Timber and Lumber — Untreated	9-23			
9-4.38	Timber Piling — Untreated	9-24			

9-4.1 Portland Cement or Blended Hydraulic Cement

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, product is listed under appropriate specification.

2. **Preliminary Samples:** Preliminary samples will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. Acceptance/Verification

a. Acceptance

(1) **Bulk Cement:** Bulk cement will be accepted upon receipt of a Manufacturer's Mill Test Report Number, which shall be reported on each certified concrete delivery ticket.

(2) **Bagged Cement:** If the quantity of bagged cement exceeds 400 bags, then it will be accepted by "SATISFACTORY" test reports from the State Materials Laboratory. If a sample is needed, acquire a 10-pound sample from one of every 400 bags and ship to the State Materials Laboratory for testing. Allow a minimum of 14 days from receipt of the sample at the Laboratory for testing. DO NOT permit the use of bagged cement until a "SATISFACTORY" test report has been received from the State Materials Laboratory.

b. **Verification:** Manufacturing mills will provide samples directly to the State Materials Laboratory on a quarterly basis to compare with the manufacturing mill test report. The Engineer may take samples for testing as described in *Standard Specification* Section 9-01.3.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual.

5. **Specification Requirements:** See *Standard Specification* Section 9-01. Review contract documents to determine if supplemental specifications apply.

9-4.2 Bituminous Materials

1. **Approval of Material:** Approval of the materials are required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071). A preliminary sample consists of two 1-quart cans.

3. Acceptance/Verification

a. **Acceptance:** Bituminous materials may be used after receipt by the Engineer of Asphalt Supplier's Certification of Compliance incorporated in their Bill of Lading with the information required by the *Standard Specification 9-02*. Examine these certificates to make sure the material is of the grade required and that it comes from the approved supplier and point of shipment.

b. **Verification:** Samples for verification conformance will be taken based on the frequencies as stated in Section 9.5-7 of this manual. Because the entire sample may be used in testing, it is necessary to take a backup for each sample. The samples shall be taken and labeled in duplicate by the Engineer with both samples forwarded promptly to the State Materials Laboratory. Asphalt Binder's (PG, AR, etc.) shall be taken at a frequency corresponding to every other HMA acceptance sample. The first, third, fifth, and every fifth sample thereafter will be tested. Emulsions and cutbacks (such as MC and RC grades) shall be sampled from every other shipment. Emulsion used exclusively for tack coat (such as STE-1 and CSS-1) do not require sampling.

Consult the FOP for AASHTO T40 for detailed sampling procedures. Samples shall be taken as close as possible to the point where the material is to be used; i.e., pug mill, distributor, etc. In the case of cutback asphalt's, sampling may be from the distributor itself, by opening a valve or one of the nozzles. If a hand nozzle is available, the sample may be drawn off there. Asphalt binder for use in a plant should be sampled by drawing from either the supply line between the storage tank and the mixer or the storage tank. Specifications require the Contractor to install a valve for this purpose.

If samples cannot be taken from the distributor, as outlined above, they may be taken from the storage tank. Samples taken directly from storage tanks must be taken with a "thief," so that they do not include surface material and are from near the middle of the asphalt in storage. They may be taken by the grab method — that is, the full amount of the sample will be taken at one time or at one spot in the car.

Samples of emulsified asphalt shall be taken as close as possible to the location the materials are used, but they must be taken before any dilution of the material takes place.

The containers for all liquid asphalt products except emulsions will be approximately 1-quart cans with 1 $\frac{3}{4}$ -inch screw caps. Containers for emulsions shall be 1-quart plastic. Always use new, clean containers that are free of rust, dents, or other

weaknesses that may cause leaking or contamination. Containers previously used for any other purpose will not be satisfactory regardless of how well cleaned they are considered to be. The outside of the containers must not be cleaned by immersion in kerosene or other solvent because of the danger of contaminating the sample. Containers must not be cooled by immersion in water or other liquid as contraction may draw contaminants into sample. Enter complete data on gummed label DOT Form 350-016 and attach to each of the two cans. Complete a Sample Transmittal (DOT Form 350-056) and attach it, in its envelope, to the container. If tape is used to attach envelope to container, or the containers together, be sure the tape is not contacting the label(s).

4. **Field Inspection:** Check the "Bill of Lading" that the liquid asphalt delivered complies with the requirements of the approved mix design. Check temperature to which material is heated to make sure specified limits are not exceeded, see *Standard Specification 9-02.3*.

5. **Specification Requirements:** See *Standard Specifications* Section 9-02. Review contract documents to determine if supplemental specifications apply. In addition, refer to project mix design.

9-4.3 Hot Melt Traffic Button Adhesive

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071). Submit Manufacturers Certificate of Compliance meeting the requirements of *Standard Specifications* Section 1-06.3, including supporting tests reports to State Materials Laboratory for evaluation.

3. Acceptance/Verification

a. **Acceptance:** Field Verify per Section 9-1.5C of this manual.

b. **Verification:** Submit a sample of each lot of material to the State Materials Laboratory for testing.

4. **Field Inspection:** Field Verify per Section 9-1.5C of this manual. Verify correct heating of product per manufacturers recommendations.

5. **Specification Requirements:** See *Standard Specifications* Section 9-02.1(8). Review contract documents to determine if supplemental specifications apply.

9-4.4 Concrete Aggregates

1. **Approval of Material:** Consult the Aggregate Sources Approval (ASA) database for approval of material for each source prior to use.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on the Request for Approval of Material (DOT Form 350-071) or if the ASA database indicated that the aggregate source has expired. Contact the Regional Materials Office if preliminary samples are required. Preliminary samples for Concrete Aggregate shall be made up of 50-100 pounds of clean, washed coarse aggregate and 20-25 pounds of clean washed fine aggregate. The sample is to be shipped in increments, using satisfactory containers, not exceeding 30 pounds.

3. **Acceptance:** After the source has been approved, concrete aggregates may be accepted upon satisfactory field tests for grading, cleanliness and free from excessive organic matter, silt, and soft or foreign pieces. Acceptance samples shall be obtained, tested, and recorded in accordance with the *Standard Specifications* Section 9-03.1, the contract special provisions, and Chapters 9-5 of this manual.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for uniformity of plants within each lot and for representative sample lost based on the following:

5. **Specification Requirements:** See *Standard Specifications* Section 3-02 and 9-03.1. Review contract documents to determine if supplemental specifications apply.

9-4.5 Surfacing Aggregates (Crushed Screening, Crushed Cover Stone, Ballast, Shoulder Ballast, Crushed Surfacing Base and Top Course)

1. **Approval of Material:** Consult the Aggregate Sources Approval (ASA) database for approval of material for each source prior to use.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on the Request for Approval of Material (DOT Form 350-071) or if the ASA database indicated that the aggregate source has expired. Contact the Regional Materials Office if preliminary samples are required. Preliminary samples for Surfacing Aggregate made up of 80-120 pounds are required to perform the qualifying tests. The sample is to be shipped in increments, using satisfactory containers, not exceeding 30 pounds.

3. **Acceptance:** After the source has been approved, surfacing aggregates may be accepted upon satisfactory field tests. Acceptance samples shall be obtained, tested, and recorded in accordance with the contract special provisions, and Chapters 9-5 and 9-8 of this manual.

4. **Field Inspection:** See Chapters 9-8 for Sampling Methods and Testing Procedures. Discuss test results with the Contractor's representative. Enforce provisions of the *Standard Specifications* regarding stockpiling.

5. **Specification Requirements:** See *Standard Specifications* Sections 3-02, 9-03.4, and 9-03.9. Review contract documents to determine if supplemental specifications apply.

9-4.6 Aggregates for Hot Mix Asphalt (HMA) and Asphalt Treated Base

1. **Approval of Material:** Consult the Aggregate Sources Approval (ASA) database for approval of material for each source prior to use.

2. Preliminary Samples

a. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on the Request for Approval of Material (DOT Form 350-071) or if the ASA database indicated that the aggregate source has expired. Contact the Regional Materials Office if preliminary samples are required. Preliminary samples for the aggregate shall be made up of 80-120 pounds as required to perform the quality tests. The sample is to be shipped in increments, using satisfactory containers, not exceeding 30 pounds.

b. **Preliminary Mix Design Samples:** These samples are used to determine if the aggregate source is capable of meeting the mix design specification requirements. Preliminary samples shall be made up of 200 pounds of rock or pit run gravel and 25 pounds of blend sand if utilized. Contact the Regional Materials Office if preliminary samples are required. Give full details of type of construction proposed. The sample is to be shipped in increments, using satisfactory containers, not exceeding 30 pounds.

3. **Acceptance:** After the source has been approved, the aggregates may be accepted upon satisfactory field tests. Acceptance samples shall be obtained, tested, and recorded in accordance with the *Standard Specifications*, the contract special provisions, and Chapters 9-5 and 9-8 of this manual. Aggregates produced for use on the current contract shall be sampled and tested for fracture and sand equivalent as the material is placed into stockpile. When material is used from a stockpile that has not been tested as provided above, the requirements for fracture, sand equivalent, flat and elongated, and uncompacted void content of fine aggregate shall apply at the time of its introduction to the cold feed of the mixing plant. Acceptance of the aggregate for gradation shall be based on samples taken from the Hot Mix Asphalt.

If the aggregates are being produced for use on a future contract, they shall be sampled and tested for gradation as well as fracture, sand equivalent, flat and elongated, and uncompacted void content of fine aggregate at the time the material is placed in stockpile.

4. **Field Inspection:** See Chapter 9-8 for Sampling Methods and Testing Procedures. Discuss test results with the Contractor's representative. Enforce provisions of the *Standard Specifications* regarding stockpiling.

5. **Specification Requirements:** See *Standard Specifications* Sections 3-02, 9-03.6 and 9-03.8. Review contract documents to determine if supplemental specifications apply.

9-4.7 Hot Mix Asphalt (HMA) and Asphalt Treated Base

1. **Approval of Material:** Approval of the materials for Hot Mix Asphalt (HMA) and asphalt treated base are required prior to use.

A current approved mix design is required for each contract. An approved mix design is only valid for a single construction season.

- a. **Job Mix Design:** Send a total of 600 pounds of aggregate proportion as the Contractors' proposal to the State Materials Laboratory for testing. For example, the Contractors' proposal consists of five stockpiles with following blending ratio.

Material	Ratio
¾" - No. 4	20%
½" - No. 8	30%
⅜" - No. 16	30%
No. 4 - 0	15%
Blend Sand	5%

Calculate the amount of aggregate needed from each stockpile in the following manner.

Material		Pounds of aggregate needed per stockpile
¾" - No. 4	600 pounds x 0.20	120 pounds
½" - No. 8	600 pounds x 0.30	180 pounds
⅜" - No. 16	600 pounds x 0.30	180 pounds
No. 4 - 0	600 pounds x 0.15	90 pounds
Blend Sand	600 pounds x 0.05	30 pounds

The sample is to be shipped in increments, using satisfactory containers, not exceeding 30 pounds.

The aggregate samples must be accompanied by completed sample transmittals from the Project Engineer and the contractor's proposal containing the following data: individual stockpile average gradations, proposed combining ratios of aggregate stockpiles, which when calculated will reflect the proposed gradation of the completed mix. Also include the asphalt supplier(s) and grade of the asphalt binder.

- b. **Reference Mix Design:** A reference mix design can be used if there is a current valid mix design previously developed using the same materials and JMF as the one proposed. Contact the State Materials Laboratory, Bituminous Section for availability.
2. **Preliminary Samples:** Not required.
3. **Acceptance:** After the sources have been approved, the aggregates may be accepted upon satisfactory field tests, for gradation and asphalt binder content. Acceptance samples shall be obtained, tested, and recorded in accordance with the *Standard Specifications*, the contract special provisions, and Chapters 9-5 and 9-8 of this manual. The sampling will be on a random basis using the procedures shown in WSDOT Test Method 716. The sampling and testing frequency for each lot is indicated in Chapter 9-5.7.

4. **Field Inspection:** The Engineer should perform a plant inspection prior to production. Contact the Regional Materials Office for assistance with this inspection. See Chapters 9-8 for Sampling Methods and Testing Procedures. Discuss test results with the Contractor's representative.

5. **Specification Requirements:** See *Standard Specifications* Sections 5-04, 9-03.6, and 9-03.8. Review contract documents to determine if supplemental specifications apply.

9-4.8 Mineral Filler

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Sample:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071). Ship 3 pounds in polyethylene bag.

3. **Acceptance:** Acceptance of mineral filler (commercial stone dust) shall be based on "SATISFACTORY" laboratory tests only for each lot of 50 tons or less. Portland cement may be accepted without test if it is furnished in original factory sacks and is not lumpy.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. See that the mineral filler does not contain foreign material or lumps.

5. **Specification Requirements:** See *Standard Specifications* Section 9-03.8(5). Review contract documents to determine if supplemental specifications apply.

9-4.9 Gravel Base and Bank Run Gravel for Trench Backfill

1. **Approval of Material:** Consult the Aggregate Sources Approval (ASA) database for approval of material for each source prior to use.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on the Request for Approval of Material (DOT Form 350-071) or if the ASA database indicated that the aggregate source has expired. Contact the Regional Materials Office if preliminary samples are required. Preliminary samples for the aggregate shall be made up of 50-100 pounds are required to perform the quality tests. The sample is to be shipped in increments, using satisfactory containers, not exceeding 30 pounds.

3. **Acceptance:** After the source has been approved, the aggregates may be accepted upon satisfactory field tests. Acceptance samples shall be obtained, tested, and recorded in accordance with the *Standard Specifications*, the contract special provisions, and Chapters 9-5 and 9-8 of this manual.

4. **Field Inspection:** See Chapter 9-8 for Sampling Methods and Testing Procedures. Discuss test results with the Contractor's representative. Enforce provisions of the *Standard Specifications* regarding stockpiling.

5. **Specification Requirements:** See *Standard Specifications* Section 3-02, 9-03. Review contract documents to determine if supplemental specifications apply.

9-4.10 Pit Run Aggregates (Gravel Backfill for Foundation CL, B, Walls, Pipe Zone Bedding, Drains and Drywells; Backfill for Sand Drains, Sand Drainage Blanket, Bedding Material for Rigid Pipe, Thermoplastic Pipe; Foundation Material Class A, B, and C, Gravel Borrow, Common Borrow, Select Borrow)

1. **Approval of Material:** Consult the Aggregate Sources Approval (ASA) database for approval of material for each source prior to use. For Borrow sources, approval of source can be performed in the field by conforming that the gradation and SE meets the requirements as defined in Section 9-03 of the *Standard Specifications*.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on the Request for Approval of Material (DOT Form 350-071) or if the ASA database indicated that the aggregate source has expired. Contact the Regional Materials Office if preliminary samples are required. Preliminary samples for the aggregate shall be made up of 80-120 pounds are required to perform the quality tests. The sample is to be shipped in increments, using satisfactory containers, not exceeding 30 pounds.
3. **Acceptance:** After the source has been approved, and prior to use, the gradation and SE tests shall be performed to determine if the material does in fact meet specifications for intended use. The aggregates may be accepted upon satisfactory field tests. Acceptance samples shall be obtained, tested, and recorded in accordance with the *Standard Specifications*, the contract special provisions, and Chapters 9-5 and 9-8 of this manual.
4. **Field Inspection:** See Chapter 9-8 for Sampling Methods and Testing Procedures. Discuss test results with the Contractor's representative. Enforce provisions of the *Standard Specifications* regarding stockpiling.
5. **Specification Requirements:** See *Standard Specifications* Section 3-02, 9-03. Review contract documents to determine if supplemental specifications apply.

9-4.11 Vacant

9-4.12 Premolded Joint Filler for Expansion Joints

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification. See Section 9-1.5B for Low Risk Materials when premolded joint filler for expansion joints is used for sidewalks.
2. **Preliminary Samples:** When a preliminary sample is required, it shall consist of a 1 square foot section from each lot of material used. Submit sample to the State Materials laboratory for testing.

3. **Acceptance:** Materials shall be accepted on receipt of "SATISFACTORY" test reports from the State Materials Laboratory. If the lot can be identified and proven to have prior satisfactory acceptance test results, it may be used without testing on current projects per Section 9-5.2D of this manual.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for accuracy in cutting, stapling, and care in handling.

5. **Specification Requirements:** See *Standard Specifications* Section 9-04.1. Review contract documents to determine if supplemental specifications apply.

9-4.13 Elastomeric Expansion Joint Seals

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** When a preliminary sample is required, it shall consist of a 2 feet section from each lot of material used. Submit sample to the State Materials laboratory for testing.
3. **Acceptance:** The material/product may be accepted on a "SATISFACTORY" test report from the State Materials Laboratory. If the lot can be identified and proven to have prior satisfactory acceptance test results, it may be used without testing on current projects per Section 9-5.2D of this manual.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual.
5. **Specification Requirements:** See *Standard Specifications* Section 9-04.1. Review contract documents to determine if supplemental specifications apply.

9-4.14 Two Component Poured Rubber Joint Sealer

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** When a preliminary sample is required, it shall consist of an unopened container of each component from each lot of material used unless specifically exempted by the State Materials Laboratory. Submit sample to the State Materials Laboratory for testing.
3. **Acceptance:** Material shall be accepted on "Satisfactory" test report or lot approval by the State Materials Laboratory. If the lot can be identified and proven to have prior satisfactory acceptance test results, it may be used without testing on current projects per Section 9-5.2D of this manual.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Make certain that application is in accordance with requirements of *Standard Specifications* and manufacturer's written recommendations. In order to obtain satisfactory adhesion of the sealer, joints must be thoroughly cleaned before the sealer is applied.

5. **Specification Requirements:** See *Standard Specifications* Section 9-04.2(2). Review contract documents to determine if supplemental specifications apply.

9-4.15 Hot Poured Joint Sealant

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, product is listed under appropriate specification, and a "SATISFACTORY" test report from the State Materials Laboratory prior to use.

2. **Preliminary Samples:** When a preliminary sample is required, submit one box sample to the State Materials Laboratory for testing.

3. **Acceptance:** The material/product shall be accepted on a "SATISFACTORY" test report from the State Materials Laboratory. If the lot can be identified and proven to have prior satisfactory acceptance test results, it may be used without testing on current projects per Section 9-5.2D of this manual.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Ensure that application is in accordance with requirements of the *Standard Specifications* Section 5-04.3(5C), 5-05.3(8)B and the manufacturer's recommendation.

5. **Specification Requirements:** See *Standard Specifications* Section 9-04.2(1). Review contract documents to determine if supplemental specifications apply.

9-4.16 Concrete Culvert, Sewer, Drain, and Underdrain Pipe

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). Notify Materials Fabrication Inspection Office of need to approve fabricator and provide Inspection Services. If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:**

- a. Concrete pipe less than 30 inches in diameter will be accepted based on "Concrete Pipe Acceptance Reports" which shall accompany the pipe to the job. Individual pipes are not stamped.

b. Concrete pipe 30 inches in diameter and larger are individually inspected at the plant prior to shipment. Accepted pipe will be stamped "APPROVED FOR SHIPMENT" with ID number (Figure 9-5) on each piece of pipe, numbers repeated per inspection visit, number will differ for different diameters.

4. **Field Inspection:**

a. Concrete pipe less than 30 inches in diameter:

- (1) Verify that the "Concrete Pipe Acceptance Report" is current and covers the diameter quantity and class of pipe delivered.

- (2) Inspect the manufacture date marked in each pipe to verify that it was made within the period covered by the Inspection Report. Also verify that shipment was made after the required retention time. *Standard Specifications* require 28 days for pipe using Type II cement and seven days for pipe using Type III cement. If tested and accepted at an earlier age these requirements may be modified.

- (3) Verify that the pipe is free from damage from handling and shipping.

- (4) Concrete sewer pipe requires testing after installation in conformance with the *Standard Specifications* Section 7-04.3.

- (5) Complete the upper portion of the "Concrete Pipe Acceptance Report" and forward to the contract files.

b. Concrete pipe 30 inches in diameter and larger:

- (1) Verify that each pipe in the shipment is stamped "APPROVED FOR SHIPMENT." Only properly stamped pipe may be accepted.

- (2) Verify that pipe is free from damage from shipping and handling. Concrete sewer pipe requires testing after installation in conformance with the *Standard Specifications* Section 7-04.

5. **Specification Requirements:** See *Standard Specifications* Section 9-05. Review contract documents to determine if supplemental specifications apply.

9-4.17 Galvanized Steel, Pipe Arch, Aluminized Steel and Aluminum Corrugated Metal Culvert, Drain Pipe and Perforated Underdrain Pipe

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification. Notify Materials Fabrication Inspection Office of the need to provide Inspection Services for a fabrication facility not listed on the QPL. Approval of the fabrication facility as well as the base metal must be obtained.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. Acceptance:

a. **QPL Acceptance:** Untreated metal culvert and drainpipe may be accepted at the job site from pipe provided by a manufacturer listed in the QPL. If the pipe shipment does not identify the pipe manufacturer, shipping Bill of Lading should be requested prior to accepting or installing the pipe. Pipe delivered without the appropriate AASHTO specification for the steel sheet, gauge thickness, and heat number stamped on the pipe, shall not be installed. Record heat numbers for each pipe installation. Any pipe, which is damaged in any way from shipping or handling, should not be accepted.

b. Non-QPL Acceptance:

(1) The Materials Fabrication Inspection Office will inspect treated metal culvert pipe at the point of fabrication. A representative number of pipes in each shipment will display “WSDOT INSPECTED,” stamp. See Figure 9-3. If none of the pipe bears the “WSDOT INSPECTED” stamp, contact the Fabrication Inspection Office to arrange for an on site inspection prior to installation.

(2) In addition to verifying material has in fact been approved for use, acceptance shall consist of obtaining a Manufacturer’s Certificate of Compliance with supporting Mill Test Reports prior to use.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check each delivery for fabrication details and quality of workmanship. Check for shipping damage and ensure that the spelter coating is intact. Check treated pipe for damage to coating. Obtain documentation for all pipes not accepted under provisions established in the QPL. Contact the Materials Fabrication Inspection Office for assistance.

5. **Specification Requirements:** See *Standard Specifications* Section 9-05. Review contract documents to determine if supplemental specifications apply.

9-4.18 Perforated Underdrain Pipe

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** Not required unless requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Pipe may be accepted on Manufacturer’s Certificate of Compliance and field inspection.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for compliance with specifications, particularly the size and spacing of holes, and for shipment and handling damage.

5. **Specification Requirements:** See *Standard Specifications* Section 9-05.2. Review contract documents to determine if supplemental specifications apply.

9-4.19 Structural Plate Pipes and Arches

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Acceptance may be on the basis of Manufacturer’s Certificate of Compliance, with accompanying mill test reports. The certification must accompany the shipment and must contain the information which is listed hereinafter:

a. Chemical analysis of the base metal of each heat number in the shipment

b. The mass of zinc coating for each heat number in the shipment

c. A statement that all materials conform to requirements of the specifications

d. The certification must be on company letterhead and signed by a responsible company official whose title shall be indicated. All suppliers of structural plate pipe and arches are to transmit four copies of the certification to the Project Engineer. At least one copy must accompany the shipment; the others may be forwarded through the Contractor. Two copies of the certification are to be retained in the Project Engineer’s files.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for breaks in zinc or asphalt coating and for damage from shipment. Material in the shipment must be properly identified as to heat number.

5. **Specification Requirements:** See *Standard Specifications* Section 9-05.6. Review contract documents to determine if supplemental specifications apply.

9-4.20 Gray-Iron Castings, Steel Castings, Ductile-Iron Castings (Catch Basin Frames and Grates, Manhole Rings and Covers, Monument Case and Cover, etc.)

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). An inspection to qualify a manufacturer will be required only if requested on Request for Approval of Material (DOT Form 350-071). The Materials Fabrication Inspection Office will perform an on-site inspection of the manufacturing facilities prior to approval. Notify the Materials Fabrication Inspection Office of need to provide Inspection Services.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Acceptance will be based on Inspected Items Stamp (Figure 9-7). All castings will be steel stamped by the Materials Fabrication Inspection Office Inspector. An “F” or “D” will be stamped to indicate the steel or iron is of foreign or domestic origin. Certificate of Material Origin will be the responsibility of the project office.

For Rectangular Frames and Grates, the frame and grate will each be stamped. Align the two stamps adjacent to each other. This alignment is critical as the leveling pads are ground to prevent rocking of the grates in the frames.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual.

Check for defects listed in the *Standard Specifications*. Check for the Inspector’s approved stamp (Figure 9-7) and the “F” or “D” indicator for foreign or domestic steel and document it. Check for shipping and handling damage.

5. **Specification Requirements:** See *Standard Specifications* Sections 9-05.15, and 9-22.1. Review contract documents to determine if supplemental specifications apply.

9-4.21 Sanitary Sewers

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification. An inspection to qualify a manufacturer of concrete pipe will be required only if requested on Request for Approval of Material (DOT Form 350-071). The Materials Fabrication Inspection Office will perform an on-site inspection of the manufacturing facilities prior to approval.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. Acceptance:

- a. QPL Acceptance:

If using the QPL, be sure to verify appropriate means of acceptance, see applicable Acceptance Code within the QPL.

- b. Non-QPL Acceptance:

Material may be accepted in lieu of sampling upon receipt of an “Approved” document as shown below:

- (1) Ductile Iron Sewer Pipe — Manufacturer’s Certificate of Compliance
- (2) Plain Concrete Storm Sewer Pipe — Concrete Pipe Acceptance Report *
- (3) Reinforced Concrete Storm Sewer Pipe — Concrete Pipe Acceptance Report *

- (4) Vitrified Clay Sewer Pipe — Manufacturer’s Certificate of Compliance.
- (5) PVC Sewer Pipe — Manufacturer’s Certificate of Compliance.
- (6) Ductile Iron Sewer Pipe — Manufacturer’s Certificate of Compliance.
- (7) ABS Composite Sewer Pipe — Manufacturer’s Certificate of Compliance.

*For concrete pipe 30 inches in diameter and larger, accepted pipe will be stamped “APPROVED FOR SHIPMENT” with ID number (Figure 9-5) on each piece of pipe.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check material delivered to the project for damage, and conformance to the contract documents.

5. **Specification Requirements:** See *Standard Specifications* Section 7-17. Review contract documents to determine if supplemental specifications apply.

9-4.22 Steel for Bridges

1. **Approval of Material:** Approval of the fabricator is required prior to use. Upon receipt of the “Request for Approval of Material,” the Materials Fabrication Inspection Office will inspect the fabrication shop to ensure it meets all contract requirements. A copy of the Request for Approval of Material will be sent to the Materials Fabrication Inspection Office. Approval of Fabrication Facility will include approval of steel sources used by the facility.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Materials and fabrication will be accepted on Approved for Shipment stamps or tags (Figure 9-4 or 9-5) except in the case of minor parts. An “F” or “D” will be stamped to indicate the steel or iron is of foreign or domestic origin. As soon as the fabricator receives the materials, the Materials Fabrication Inspection Office Inspector will check the accompanying mill test certificates to ensure the materials meet contract requirements. Project offices will not be required to maintain Manufacturer’s Certificates of Compliance for items from approved fabricators that have the “APPROVED FOR SHIPMENT” tag or stamp. Certificates of Material Origin will be maintained by the project office. The Materials Fabrication Inspection Office Inspector will also provide weekly written shop inspection reports to the Project Engineer while major steel structures are being fabricated.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for “APPROVED FOR SHIPMENT” tags or stamps (Figure 9-4 or 9-5) and the “F” or “D” indicator for foreign or domestic steel and document it. Check for shipping and handling damage.
5. **Specification Requirements:** See *Standard Specifications* Sections 6-03 and 9-06. Review contract documents to determine if supplemental specifications apply.

9-4.23 Unfinished Bolts (Ordinary Machine Bolts), Nuts, and Washers

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Unfinished bolts, nuts, and washers may be accepted on receipt of Manufacturer's Certificate of Compliance. If using the QPL, be sure to verify appropriate means of acceptance, see applicable Acceptance Code within the QPL.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual check each lot of material delivered to the project for damage, and that accompanying Manufacturer's Certificate of Compliance is present.
5. **Specification Requirements:** See *Standard Specifications* Section 9-06.5(1). Review contract documents to determine if supplemental specifications apply.

9-4.24 High Strength Bolts, Nuts and Washers

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Materials may be accepted on receipt of "SATISFACTORY" test reports from the State Materials Laboratory. When the materials are received on the job site, sample each shipment of the bolts, nuts, and washers in accordance with the table in Section 9-06.5(3) of the *Standard Specifications*. A separate transmittal and materials certification shall accompany each sample of bolts, each sample of washers, and each sample of nuts.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual Make certain that material being used is from a lot represented by "SATISFACTORY" test report.
5. **Specification Requirements:** See *Standard Specifications* Section 9-06.5(3). Review contract documents to determine if supplemental specifications apply.

9-4.25 Anchor Bolts

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification. Notify the Materials Fabrication Inspection Office of need to provide Inspection Services.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Acceptance may be based on "Approved for Shipment" tags and/or stamp (Figure 9-4 or 9-5). An "F" or "D" will be stamped to indicate the steel or iron is of foreign or domestic origin. Certificate of Material Origin will be the responsibility of the project office.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for "APPROVED FOR SHIPMENT" tags and/or stamp (Figure 9-4 or 9-5) and the "F" or "D" indicator for foreign or domestic steel and document it. Check for damage due to shipping and handling.
5. **Specification Requirements:** See *Standard Specifications* Section 9-06.5(4). Review contract documents to determine if supplemental specifications apply.

9-4.26 Reinforcing Bars for Concrete

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071).
2. **Preliminary Samples:** May be required if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Acceptance will be by the Fabricators Certification of Compliance and Certified Mill Test Reports that will accompany each shipment.

Note: If Mill Test reports are not available, do not incorporate steel into the project and contact the State Materials Laboratory, General Materials Engineer for guidance.

Representative of the Materials Fabrication Inspection Office may take random samples at the point of fabrication.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for Certification of Compliance and Certified Mill Test Reports for sizes and heats of rebar. Remove excess rust and mill scale before using. Check steel fabrication and bends for compliance with contract documents.
5. **Specification Requirements:** See *Standard Specifications* Section 9-07. Review contract documents to determine if supplemental specifications apply.

9-4.27 Epoxy Coated Reinforcing Steel Bars for Concrete

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071). Notify Materials Fabrication Inspection Office of need to provide Inspection Services.

3. **Acceptance:** Material may be accepted on "APPROVED FOR SHIPMENT" stamp or tag (Figure 9-4 or 9-5). An "F" or "D" will be stamped to indicate the steel or iron is of foreign or domestic origin. Certificate of Material Origin will be the responsibility of the project office.

Note: If bar is not tagged "APPROVED FOR SHIPMENT" do not incorporate steel into the project and contact the Materials Fabrication Inspection Office for guidance.

Representatives of the Materials Fabrication Inspection Office may take random samples at the point of fabrication and at the coating facility. The Fabricator shall provide the Mill Certificates to the Materials Fabrication Inspection Office Inspector.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check shipment for "APPROVED FOR SHIPMENT" stamp or tag (Figure 9-4 or 9-5) and the "F" or "D" indicator for foreign or domestic steel and document it. Check coating for shipping damage, check steel fabrication and bends for compliance with contract documents.

5. **Specification Requirements:** See *Standard Specifications* Section 9-07. Review contract document to determine if supplemental specifications apply.

9-4.28 Mechanical Splices

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Sample:** A preliminary sample for qualifying the rebar coupling system, will be required only if requested on Request for Approval of Material (DOT Form 350-071). The sample to include a made up splice for each size bar to be used and include the manufacturers product information. The overall length of spliced rebars should be approximately 5 to 6 feet.

3. **Acceptance:** Material may be accepted on receipt of a "SATISFACTORY" Test Report from the State Materials Laboratory from contractors assembled samples (see Note) taken from the project. A Manufacturer's Certificate of Compliance and other technical data MUST be submitted with the samples. The overall length of spliced rebars should be at least 5 feet.

Note: This is a test of the Contractors ability to properly assemble the splice as much as it is a test of the quality of the materials. For this reason the spliced bars must be assembled by the contractors personnel, witnessed by the inspector and transmitted intact to the State Material Lab for testing.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual and that the material has "Satisfactory" test results.

5. **Specification Requirements:** See *Standard Specifications* Section 6-02.3(24)F and G. Review contract documents to determine if supplemental specifications apply.

9-4.29 Rebar Chairs, Dobies, and Spacers

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Sample:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:**

a. **Dobie Blocks:** Material may be accepted on receipt of Manufacturer's Certificate of Compliance with supporting test reports. See *Standard Specifications* Section 6-02.3(24)C.

b. **Rebar Chairs and Spacers:** May be accepted based upon inclusion in the QPL as an "Approved" product.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual.

5. **Specification Requirements:** See *Standard Specifications* Section 6-02.3(24)C. Review contract documents to determine if supplemental specifications apply.

9-4.30 Dowels and Tiebars for Concrete Pavement, incl. Epoxy Coated

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Sample:** A preliminary sample of two dowels will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Acceptance may be on Manufacturer's Certificate of Compliance with accompanying Mill Test Reports for both steel and coating process.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for dimensional conformance and if proper mill test certificates have been provided. Check epoxy coating for damage and uniformity

5. **Specification Requirements:** See *Standard Specifications* Section 9-07.5 and 9-07.6. Review contract documents to determine if supplemental specifications apply.

9-4.31 Wire Reinforcement for Concrete

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** May be required if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Acceptance will be by the Manufacturer's Certificate of Compliance and Certified Mill Test Reports that accompany each shipment.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for excessive rust on wire, and check the spacing of the wires and weight per square yard.
5. **Specification Requirements:** See *Standard Specifications* Section 9-07.7, 9-07.8, and 9-07.9. Review contract documents to determine if supplemental specifications apply.

9-4.32 Bridge Approach Slab Anchors

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Sample:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:**
 - a. **Anchors Type A:** These anchors may be accepted on a Manufacturer's Certificate of Compliance for the Steel Rod and Plate.
 - b. **Anchors Type B:** These anchors may be accepted on a Manufacturer's Certificate of Compliance for the Threaded Steel Rod and Steel Plate and Manufacturer's Product Information on inch stop coupling.
 - c. **Other Anchor Rod materials:** Such as plastic pipe, polystyrene, and duct tape may be accepted on visual inspection.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check material delivered to the project for conformance with the contract plan and specifications.
5. **Specification Requirements:** See *Standard Plans A2* and *Standard Specifications* Section 6-02.3(10). Review contract documents to determine if supplemental specifications apply.

9-4.33 Prestressing/Post Tensioning Reinforcement — Strand

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance /Verification:**
 - a. **Acceptance:** The strand may be accepted upon receipt of a Manufacturer's Certificate of Compliance, a mill certificate, supporting test report and the stress/strain curve
 - b. **Verification:** The strand shall be tested for verification prior to placement. Samples for verification of conformance will be taken from each reel furnished to the project site or the fabrication facility. The samples shall not be less than 5 feet in length. All samples must include the Manufacturer's Certificate of Compliance, a mill certificate with supporting test report, and the stress/strain curve.

Submit 1 sample for each 5 reels to the State Materials Laboratory for testing. A copy of the Manufacturer's Certificate of Compliance, a mill certificate with supporting test report, and the stress/strain curve MUST accompany each sample submitted for testing. Upon receipt of a passing test report, the other 4 retained samples may be discarded. If the submitted sample fails the testing, submit the 4 retained samples taken before and the 4 retained samples taken after the failing sample for additional testing.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check the strand for dirt, grease or rust.
5. **Specification Requirements:** See *Standard Specifications* Section 9-07.10. Review contract documents to determine if supplemental specifications apply.

9-4.34 Prestressing/Post Tensioning Reinforcement — Bar

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Acceptance will be on "SATISFACTORY" laboratory test report only. Send two samples from each heat. If supplemental requirements apply, send additional samples of two bars from each heat. See contract documents. The samples must be a minimum of

5 feet in length. A copy of the Manufacturer's Certificate of Compliance shall accompany each heat of reinforcing bar.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check material delivered to the project for damage.

5. **Specification Requirements:** Review contract documents to determine specification requirements.

9-4.35 Paints for Structures

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** Preliminary Samples will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Paint will be sampled at the point of manufacture by the manufacturer, supplied to WSDOT Fabrication Inspection Office, Seattle, WA (206) 464-7770 and tested by the State Materials Laboratory prior to its receipt on the project. The lot number on the containers must be checked against the Laboratory test reports. Except as indicated, paint which has not been tested and accepted by the Laboratory will **not** be used. When less than 20 gallons of one kind of paint are involved, its use without laboratory tests may be approved upon the Manufacturer's Certificate of Compliance that the material meets the specification. The certificate shall include a list of materials and the quantities used. One copy of the certificate shall be submitted to the State Materials Laboratory for approval.

4. **Field Inspection:** No field samples are required. Material shall be accepted on satisfactory test report or lot approval by the State Materials Laboratory. Field verify per Section 9-1.5C of this manual. To verify approved lot numbers contact The State Materials Lab, Chemical Section (360) 709-5431.

See that paint is not caked in the container, that it is free from skins and is well stirred before withdrawing portions for use.

After application the paint should dry to a uniform film without running, streaking or sagging.

5. **Specification Requirements:** See *Standard Specifications* Section 9-08. Review contract documents to determine if supplemental specifications apply.

9-4.36 Timber and Lumber — Untreated

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:**

a. Timber and Lumber require a Grading Certificate conforming to the requirements of the *Standard Specifications*. The Grading Certificate will be issued by the grading bureau whose authorized stamp is being used, or by the mill grading the timber or lumber under the supervision of one of the following lumber grading agencies: West Coast Lumber Inspection Bureau (WCLIB), Western Wood Products Association (WWPA), or the Pacific Lumber Inspection Bureau (PLIB). A typical lumber grade stamp as used by the various inspection agencies are shown in the QPL, Appendix B:

b. Sign posts, mileposts, sawed fence posts, and mailbox posts will be accepted by visual determination in the field that materials delivered to the job site bears the appropriate lumber grading stamp. The PLIB graded lumber will be graded under the grading rules of one of the other two listed agencies and will be grade stamped accordingly. All timber and lumber is subject to re-inspection upon delivery to the project.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check that all lumber and timber has the proper lumber grade stamps.

5. **Specification Requirements:** See *Standard Specifications* Section 9-09. Review contract documents to determine if supplemental specifications apply.

9-4.37 Treated Timber and Piling

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:**

a. Structural Timber and Lumber, sign posts 6 inches x 6 inches and larger. Check for "APPROVED FOR SHIPMENT" tag (Figure 9-6). Approved for shipment tags will be stapled to the ends of the pilings or timber. All piling will be stamped or tagged on the butt end. Only about one-third of the approved timber pieces will be stamped or tagged for acceptance.

b. Sign posts less than 6 inches x 6 inches, mileposts, sawed fence posts, and mailbox posts shall be accepted as listed under 9-4.36.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check primarily for damage caused by handling. Check pieces for "APPROVED FOR SHIPMENT" stamp or tag (Figure 9-6).

5. **Specification Requirements:** See *Standard Specifications* Sections 9-09 and 9-10. Review contract documents to determine if supplemental specifications apply.

9-4.38 Timber Piling — Untreated

1. **Approval of Material:** Approval of material is not required prior to use for temporary structures.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Field inspection for compliance with contract requirements.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for compliance with specifications.
5. **Specification Requirements:** See *Standard Specifications* Section 9-10.1(1). Review contract documents to determine if supplemental specifications apply.

9-4.39 Steel Piling All Types

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** Samples are not required unless requested on Request for Approval of Material (DOT Form 350-071). Submit a 1-foot section of the piling if requested.
3. **Acceptance:** Material may be accepted on satisfactory Manufacturer's Certificate of Compliance including mill certificates showing heat number, physical properties and chemical composition. Certificate of Material Origin is the responsibility of the Project Engineer's Office.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check material in each shipment against heat numbers shown on Mill Test Certificates. Check for damage due to shipping and handling.
5. **Specification Requirements:** See *Standard Specifications* Section 9-10.5. Review contract documents to determine if supplemental specifications apply.

9-4.40 Coated Steel Piling

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Sample:** Samples are not required unless requested on Request for Approval of Material (DOT Form 350-071). Submit a 1-square foot section of the piling if requested.
3. **Acceptance:** Coated piling will be inspected prior to coating at the facility applying the coating. Piling will be stamped or tagged "Approved for Shipment" when coating requirements have been met. An "F" or "D" will be stamped

to indicate the steel or iron is of foreign or domestic origin. Manufacturer's Certificate of Compliance will be checked and maintained by Fabrication Inspection Office. Certificate of Material Origin will be the responsibility of the Project Engineer's Office.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check shipment for "APPROVED FOR SHIPMENT" stamp or tag (Figure 9-4 or 9-5) and the "F" or "D" indicator for foreign or domestic steel and document it. Check coating for shipping damage.
5. **Specification Requirements:** See *Standard Specifications* Section 9-10.5 and 6-07.3(1)A. Review contract documents to determine if supplemental specifications apply.

9-4.41 Precast Concrete Catch Basins, Manholes, and Inlets

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the will Request for Approval of Material (DOT Form 350-071).
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Acceptance will be based on "WSDOT Inspected" stamp (Figure 9-3) provided by the Materials Fabrication Inspection Office Inspector. An "F" or "D" will be stamped to indicate the steel or iron is of foreign or domestic origin. Certificate of Material Origin will be the responsibility of the project office.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check shipment "WSDOT Inspected" stamp (Figure 9-3) and the "F" or "D" indicator for foreign or domestic steel and document it. Check for shipping and handling damage.
5. **Specification Requirements:** See *Standard Specifications* Section 9-12. Review contract documents to determine if supplemental specifications apply.

9-4.42 Riprap, Quarry Spalls, Slope Protection, and Rock for Rock Wall

1. **Approval of Material:** Consult the Aggregate Source Approval Report generated from the ASA database for approved materials for each source prior to use. The Regional Materials Engineer may approve a source for non-structural applications.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on the Request for Approval of Material (DOT Form 350-071) or if the Aggregate Source Approval Report indicates that the aggregate source is not approved for the intended application. Contact the Regional Materials Office if preliminary samples are required. Preliminary samples shall be made up of 50 to 80 pounds of material sampled in a manner consistent with this manual. The sample is to be shipped in satisfactory containers, not exceeding 30 pounds in weight.

When the usage is for non-structural applications, the Region Materials Engineer may waive the requirement for preliminary samples.

3. **Acceptance:**
 - a. When project quantities are less than or equal to 150 cubic yards the Project Engineer may accept the material by visual inspection.
 - b. When project quantities exceed 150 cubic yards, the Project Engineer shall determine that the grading is in conformance with the *Standard Specifications* and contract special provisions.
 - c. When usage is for non-structural applications the Project Engineer may accept the material by visual inspection.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. See that the gradation remains constant.

5. **Specification Requirements:** See *Standard Specifications* Section 9-13 or Section 9-27. Review contract documents to determine if supplemental specifications apply.

9-4.43 Semi-Open Slope Protection

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Material may be accepted on receipt of Manufacturer's Certificate of Compliance.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check material delivered to the project for conformance with the contract plan and specifications. Also check for shipping damage.
5. **Specification Requirements:** See *Standard Specifications* Section 9-13.5. See Standard Plans. Review contract documents to determine if supplemental specifications apply.

9-4.44 Plant Material

1. **Approval of Material:** Approval of material is required prior to use. This approval will be submitted to the field office by listing the nursery to supply the plant material on a Request for Approval of Material (DOT Form 350-071).
2. Preliminary Site Inspection, when requested on the RAM, will be performed by the Region Landscape Architect or the State Horticulturalist.
3. **Acceptance:** After the approval of the material, the plants will be accepted based on field inspection on the job site. Sample lots as provided in (4), Field Inspection will be the inspection of samples delivered to the site. Acceptable samples will be incorporated into the project.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for uniformity of plants within each lot and for representative sample lot based on the following:

(N = total number of plants in lot) (n = number of plants in sample lot)

Total Number of Plants (N)	Minimum No. of Plants Required to Make Sample Lot (n)
0 - 500	All plants
501 - 1,000	500
1,001 - 5,000	600
5,001 - 30,000	850
Over 30,000	1000

Should 5 percent or less of the sample lot fail, the entire lot may be accepted. Should over 5 percent of the acceptance sample lot fail to meet nominal specification requirements, the entire lot shall be rejected and removed from the job. The Engineer may accept the plants if there is a large percentage of plants that appears to be exceptionally hearty and vigorous after sorting by the Contractor. If done immediately, the Contractor shall be allowed to sort and remove the substandard portion of the plants.

After the contractor has completed sorting, a new sample lot based on the above schedule of the remaining stock will again be selected and inspected. Should 5 percent or less of this sample lot fail, the sorted lot may be accepted.

5. **Specification Requirements:** See *Standard Specifications* Section 9-14.6. Review contract documents to determine if supplemental specifications apply.

9-4.45 Topsoil Type A

1. **Approval of Material:** Approval of Topsoil Type A prior to use is required by a Request for Approval of Material (DOT Form 350-071).
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071). Samples of 5 to 10 pounds are required to perform the qualifying tests.
3. **Acceptance:** Material may be accepted upon receipt of a Manufacturer's Certificate of Compliance with accompanying test reports verifying conformance with the Contract Specifications.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. The material shall be inspected for roots, weeds, subsoil, rocks, and other debris.
5. **Specification Requirements:** See *Standard Specifications* Section 9-14.1. Review contract documents to determine if supplemental specifications apply.

9-4.46 Seed

1. **Approval of Material:** Approval of materials is required prior to use. This approval will be by Request for Approval of Material (DOT Form 350-071). If there is a question on the intended use of the seed, contact the State Horticulturalist.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Material may be accepted on analysis shown on the label.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Each individual sack of seed must contain a label (tag) as to the contents, which must meet all requirements specified in the special provisions for each component of the seed mix and be unopened prior to use on the project. At least one label should be retained in the project records in the event that subsequent questions or claims may arise.

5. **Specification Requirements:** See *Standard Specifications* Section 9-14.2. Review contract documents to determine if supplemental specifications apply.

9-4.47 Fertilizer

1. **Approval of Material:** Fertilizer will be approved prior use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If there is a question on the intended use of the fertilizer, contact the State Horticulturist or the Region Landscape office.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:**

a. **Fertilizer for General Use.** Fertilizer may be accepted based on approval of material and chemical content shown on container labels meeting contract requirement. No fertilizer shall be used from unidentified or unlabeled containers.

b. **Fertilizer for Erosion Control.** For Erosion Control on projects with total quantities less than 5 acres, acceptance of fertilizer may be made by verification of the components based on stamped or printed bag analysis. Projects involving 5 acres or more shall require a certified analysis of each component furnished meeting the requirements of a Manufacturer's Certificate of Compliance (Section 1-06.3 of the *Standard Specifications*).

c. **Fertilizer for Landscaping.** Fertilizer for landscaping projects may be accepted on the basis of examination of the labeled contents for conformance to the project specifications.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Each individual sack must be labeled as to its contents, which must meet the requirements specified in the special provisions. All bags must be unopened prior to use on the project. Most fertilizers specified contain ureaform (38-0-0) which is blue-green in color, which makes that component's presence easy to identify. Retain label showing analysis for contract records.

5. **Specification Requirements:** See *Standard Specifications* Section 9-14.3. Review contract documents to determine if supplemental specifications apply.

9-4.48 Mulch

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Material may be accepted as described below for the different types of mulch:

- a. Straw — Visual inspection
- b. Wood Cellulose Fiber — Manufacturer's Certificate of Compliance
- c. Bark or wood chips— Field gradation test (WSDOT Test Method 123)
- d. Bonded Fiber Matrix / Mechanically Bonded Fiber Matrix – Catalog Cut
- e. Tackifier — Catalog Cut
- f. Compost — Satisfactory test report from an independent STA program certified laboratory, documentation stating that the compost facility is STA certified, waste handling permit, etc. see contract provisions. To purchase Solvita Compost Maturity Test Kits for field office use contact: Woods End Research Laboratory, Inc. Box 297, Mount Vernon, Maine 04352 (207)-293-2457 E-mail: info@woodsend.org

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. A visual inspection shall be made to ensure uniformity of the mulch. Also check for detrimental contamination.

5. **Specification Requirements:** See *Standard Specifications* Section 9-14.4. Review contract documents to determine if supplemental specifications apply.

9-4.49 Irrigation System

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification. If approval action is being requested via the RAM process, attach Catalog Cuts or other appropriate documents, using proper transmittal, to assist RAM Engineer in the approval process.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** The irrigation system material, when approved as noted above, may be accepted in the field by verifying that the materials placed on the job are the same make model, lot, batch, size, color, blend, etc. that was approved. In addition the following materials will need appropriate documentation and transmittals as noted below:

- a. PVC Water Pipe – Manufacturer’s Certificate of Compliance
- b. Polyethylene Pipe – Manufacturer’s Certificate of Compliance
- c. Galvanized Iron Pipe – Manufacturer’s Certificate of Compliance

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for damage to the galvanized coatings in shipping and handling. See that damaged areas and field cut threads are protected with an approved galvanized repair paint formula, standard formula A-9-73.

5. **Specification Requirements:** See *Standard Specifications* Section 9-15. Review contract documents to determine if supplemental specifications apply.

9-4.50 Fencing

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** The following items may be accepted on receipt of “SATISFACTORY” test report from the State or Regional Materials Laboratory. Send acceptance samples as follows:

- a. Chain Link Fabric — One sample consisting of three wires across full width of fabric from one roll for each 50 rolls.
- b. Wire Mesh — One 12-inch sample across full width of roll, from one roll for each 50 rolls.
- c. Tension and Barbed Wire — One 3-foot piece from one roll for each 50 spools.
- d. Grade 1 Post Material
 - Rails and Grade 1 Posts for Chain Link Fence — Sample to consist of one post and 12" sample from each end of the rail, where appropriate, for each 500 post or rails or fraction thereof.
 - Corner Post or brace posts — One complete post assembly per 10 corner or brace posts.
- e. Wire Fence Line Posts — One complete post with plate for each 500 posts or fraction thereof.

f. Misc. Fence Hardware — These materials includes such items as tie wire, hog rings, galvanized bolts and nuts, fence clips, stays, post caps, tension band and bars, rail end caps, etc. The Engineer shall visually inspect and approve for use.

g. Grade 2 Post Material may be accepted with a Manufacturer's Certificate of Compliance adhering to Section 9-16.1 of the *Standard Specifications*.

Above samples are to be taken from properly identified lots of material stored at job site. Be sure samples are numbered and properly identified as to Lot, if applicable, when sent to the Laboratory. If first sample fails, two additional samples are to be submitted from same lot. Resamples are to be properly identified as to Lot and referenced to previous Lab No. for first sample.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for damage to zinc or other coating on posts, rails, hardware, etc.

5. **Specification Requirements:** See *Standard Specifications* Section 9-16. Review contract documents to determine if supplemental specifications apply.

9-4.51 Beam Guardrail, Guardrail Anchors, and Glare Screen

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Materials listed on the Qualified Products List may be accepted as outlined on the QPL or by Manufacturers Certificate of Compliance meeting the requirements of *Standard Specifications* Section 1-06.3 including supporting test reports. A307 bolts will be accepted by field verification and documentation that bolt heads are stamped 307A.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check material delivered to the project for damage to galvanizing.

5. **Specification Requirements:** See *Standard Specifications* Section 9-16.3.

9-4.52 Guardrail Posts and Blocks

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on the Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Materials listed on the Qualified Products List may be accepted as outlined on the QPL. Materials not listed on the QPL will be accepted by receipt of an acceptable certificate of treatment and by visual determination in the filed that materials delivered to the job site bears the appropriate lumber grading stamp.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check material delivered to the project for conformance with the contract plan and specifications.
5. **Specification Requirements:** See *Standard Plans*.

9-4.53 Miscellaneous Precast Concrete Products (Block Traffic Curb, Precast Traffic Curb)

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** In general, the Materials Fabrication Inspection Office will not, undertake inspection of these products. When large quantities are involved, the Regional Administrator should arrange for inspection during manufacturer, including the sampling of materials and the making of test cylinders.
 - a. **Precast Traffic Curb:** Acceptance on field inspection. Unless the curb sections have been inspected prior to shipping they are to be carefully inspected upon arrival on the project site. Check for surface color and damage, such as cracks, broken corner or edges, contour and alignment. Surface color and texture should match advanced sample provide by the manufacturer. See *Standard Plans* for details.
 - b. **Block Traffic Curb:** Acceptance on visual inspection. Check exposed faces of curb sections for damage such as chips, cracks, and air holes. See *Standard Specifications* Section 9-18.3 for details. Compressive strength may be determined in accordance with the FOP for ASTM C 805.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for damage due to shipping and handling.
5. **Specification Requirements:** See *Standard Specifications* Sections 9-18. Review contract documents to determine if supplemental specifications apply.

9-4.54 Prestressed Concrete Products

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). Notify Materials Fabrication Inspection Office of need to provide Inspection Services, or to verify that the precast plant's annual review and approval are current.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Acceptance will be based on "APPROVED FOR SHIPMENT" stamp or tags (Figure 9-4 or 9-5) from Materials Fabrication Inspection Office inspection and on field inspection for damage due to shipping and handling. An "F" or "D" will be stamped to indicate the steel or iron is of foreign or domestic origin. Certificate of Material Origin will be the responsibility of the project office.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for damage due to shipping and handling. Check and record "APPROVED FOR SHIPMENT" stamp or tag (Figure 9-4 or 9-5) and the "F" or "D" indicator for foreign or domestic steel and document it.
5. **Specification Requirements:** See *Standard Specifications* Section 6-02.3(25), 6-02.3(26), 6-02.3(28), and Section 9-19. Review contract documents to determine if supplemental specifications apply.

9-4.55 Raised Pavement Markers, Types 1, 2, and 3

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:**
 - a. **Type 1 Markers.**
Plastic Markers: Shall be from tested and approved lots. Testing shall be performed at the State Materials Lab prior to use of any lot. Allow a minimum of 10 working days for testing to avoid project delays. After use, all emptied, boxes shall be destroyed.
Thermoplastic Markers: Markers listed on the QPL may be accepted based on visual inspection as to brand and model listed. Verification samples of Type 1 thermoplastic markers are required for each lot used on a project. A sample shall consist of three markers per job lot (from different boxes) for each color.
 - b. **Type 2 Markers:** Only markers listed on the QPL may be accepted, visually inspect markers as to brand and model listed.
 - c. **Type 3 Markers:** Only markers listed on the QPL may be accepted, visually inspect markers as to brand and model listed.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. A visual inspection shall be made to ensure that cracked or damaged lane markers are not incorporated in the work.

5. **Specification Requirements:** See *Standard Specifications* Section 9-21. Review contract documents to determine if supplemental specifications apply.

9-4.56 Signing Materials

1. **Approval of Material:** Approval of the sign fabricator as well as the manufacturer of the sign blanks, panels and the reflective sheeting is required prior to use. Approval of the sign fabricator will be by a Request for Approval of Material (DOT Form 350-071). A RAM will not be required for sign mounting hardware provided by the sign fabricator. Mounting hardware from a source other than the sign fabrication facility will require approval by the or an approved Request for Approval of Material (DOT Form 350-071). Approval of the sign blanks, panels and the reflective sheeting may be by the Qualified Products List or by an approved Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that product is in fact qualified for its intended use; product is listed under appropriate specification. The fabrication facility will notify Sign Fabrication Inspector of need to provide Inspection Services.

2. **Preliminary Samples:** A preliminary sample of the material may be requested on the Request for Approval of Material (DOT Form 350-071), or as requested by the Sign Fabricator Inspector.

3. **Acceptance:** Materials and fabrication will be accepted on "FABRICATION APPROVED" decal (Figure 9-8).

a. **Sign Blanks:** As soon as the fabricator receives the materials, the Sign Fabricator Inspector will check the accompanying mill test certificates to ensure the materials meet contract requirements. These documents will be kept at the fabrication facility.

b. **Reflective Sheeting:** The Sign Fabricator Inspector will check the Manufacturer's Certificate of Compliance for the reflective sheeting and the cutout legend to ensure the materials meet contract requirements. These will be kept at the sign fabrication facility.

c. Sign Mounting Hardware supplied by the Sign Fabricator will have the mounting hardware certifications verified at the sign fabricator's facility by the Fabrication Inspector to ensure the materials meet the contract requirements. These records will be kept at the sign fabrication facility. Fabrication inspectors will verify sign mounting hardware as it is packaged for shipment and attach a "WSDOT INSPECTED" Tag to the sealed package.

Contractor's who purchase sign mounting hardware separately from a source other than a WSDOT approved sign fabrication facility will be required to supply proper Manufacturer's Certificates of Compliance and it will be the responsibility of the contractor to supply the certifications to the Project Engineer's Office prior to use.

Where *Standard Specifications* 9-28.11 allows use of A307 bolts for roadside wood posts, field verify A307 lag bolts were used, no further certification will be required for A307 bolts.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for a "FABRICATION APPROVED" decal (Figure 9-8) on the back of the sign and document Inspector's Daily Report. Check for a "WSDOT INSPECTED" stamp on sign mounting hardware and document. Check that all overhead signs are mounted with stainless steel bolts, u-bolts, washers, nuts, locknuts, mounting brackets and straps. Mounting hardware shall include bolts, nuts, washers, locknuts, rivets, post clips, windbeams, angles, "Z" bar, straps and mounting brackets. Check for damage due to shipping, handling, and installation.

5. **Specification Requirements:** See *Standard Specifications* Section 9-28, and Section 9-1.5G of this manual. Review contract documents to determine if supplemental specifications apply.

9-4.57 Concrete Curing Compounds

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Submit 1 quart for each lot of curing compound delivered to each project. Material will be accepted based on "SATISFACTORY" test results from the State Materials Laboratory on samples taken from the project. No curing compound shall be used on WSDOT work prior to testing of each lot. Samples must be submitted for testing 14 days prior to use of curing compound.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check different lots for similarity in appearance and working properties. Check that the lots being used have "Satisfactory" test reports from the State Materials Laboratory.

5. **Specification Requirements:** See *Standard Specifications* Sections 9-23. Review contract documents to determine if supplemental specifications apply.

9-4.58 Admixtures for Concrete

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Acceptance will be on the basis of Certified Concrete Delivery Ticket, *Standard Specifications* Section 6-02.3(5)B, indicating the brand/product and dosage of the admixture as shown on the concrete mix design.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check Concrete Delivery Ticket for proper admixture usage.
5. **Specification Requirements:** See *Standard Specifications* Section 6-02.3(5) B and 9-23. Review contract documents to determine if supplemental specifications apply.

9-4.59 Plastic Waterstop

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Material may be accepted on basis of Manufacturer's Certificate of Compliance.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for uniformity of product in lot, and for damage in shipment or handling.
5. **Specification Requirements:** See *Standard Specifications* Section 9-24. Review contract documents to determine if supplemental specifications apply.

9-4.60 Epoxy Systems

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. Acceptance/Verification
 - a. **Acceptance:** Material may be accepted for use on receipt of a passing test report from the State Materials Laboratory. For epoxy bonding agents, submit mix ratios, intended use and a representative sample of each component for each batch or lot number. A representative sample may consist of 1 pint of each component for bulk lots or a pre-packaged kit. Containers shall be identified as "Component A" (contains the Epoxy Resin) and "Component B" (contains the Curing Agent) and shall be marked with the name of the manufacturer, the date of manufacture and the lot number. If the material is to be used as an epoxy grout, mortar or concrete, include a 5-pound representative sample of aggregate. Samples shall be

submitted to the State Materials Laboratory. Epoxy Adhesive for Lane Markers does not require field sampling, but does require a Manufacturer's Certificate of Compliance. A period of 15 working days should be allowed for testing.

- b. **Verification:** Proper proportioning of Epoxy Adhesive for Lane Markers can be verified at the State Materials Laboratory if desired. Submit a 1 pint sample of the field mixed epoxy in question and a 1 pint sample of each component as is detailed under "Acceptance" above.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for uniformity of color and conformance to required mix proportions. Streaking is an indication of inadequate mixing. Check for set and hardness with your thumbnail. You should not be able to dent the properly mixed and cured material. Epoxies shall be mixed and applied in conformance to manufacturer's written instructions unless otherwise modified in writing by the manufacturer's agent.

5. **Specification Requirements:** See *Standard Specifications* Section 9-26. Review contract documents to determine if supplemental specifications apply.

9-4.61 Resin Bonded Anchors

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. Acceptance:
 - a. **Qualified Product Listed Product:** If Product is listed on QPL, the acceptance of the resin adhesive shall be by field acceptance procedures documenting that brand and model of the resin system. Threaded rod, nut and washer or other inserts shall be accepted on the basis of a Manufacturer's Certificate of Compliance with supporting Mill Test Reports indicating they meet the contract requirements.
 - b. **Non-qualified Product Listed Product:** Submit independent test lab data indicating resin system meets specifications when tested in accordance with ASTM E 488, and threaded rod, nut and washer or other inserts shall be accepted on the basis of a Manufacturer's Certificate of Compliance with supporting Mill Test Reports indicating they meet the contract requirements.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for proper embedment depths. Check that holes are properly cleaned. Check that the installation is in accordance with the manufacturers written instructions.
5. **Specification Requirements:** Review contract documents to determine if supplemental specifications apply.

9-4.62 Gabion Baskets

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071). The sample shall consist of the following:
 - a. One square yard of mesh including selvage and body wire.
 - b. Three feet of tie wire.
 - c. Three feet of lacing wire.
 - d. Six each wire clips, fasteners.
3. **Acceptance:** Acceptance is based on receipt of a Manufacturer's Certificate of Compliance with accompanying Mill Test Report.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for damage.
5. **Specification Requirements:** See *Standard Specifications* Section 9-27.3. Review control documents to determine if supplemental specifications apply.

9-4.63 Sign Structures

1. **Approval of Material:** Approval of the fabricator is required prior to use. Upon receipt of the "Request for Approval of Material," the Materials Fabrication Inspection Office will inspect the fabrication shop to ensure it meets all contract requirements. A copy of the Request for Approval of Material will be sent to the Materials Fabrication Inspection Office.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** The fabricated sign structure and associated hardware will be accepted on the basis of an "APPROVED FOR SHIPMENT" stamp (Figure 9-8) An "F" or "D" will be stamped to indicate the steel or iron is of foreign or domestic origin. When the structures are fabricated out-of-state and are shipped directly to the job site, arrangements must be made with the Materials Fabrication Inspection Office to have the structures and hardware inspected prior to erection. Manufacturer's Certificates of Compliance will be required to be delivered with the sign structures from out-of-state fabrication facilities.

Certificates of Material Origin will be the responsibility of the project office.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for "APPROVED FOR SHIPMENT" stamp (Figure 9-8) on the sign structure and associated hardware. Check for and the "F" or "D" indicator for foreign or domestic steel and document it. Check for damage due to shipping, handling and erection.

5. **Specification Requirements:** See design standards and *Standard Specifications* Section 9-28.15. Review contract documents to determine if supplemental specifications apply.

9-4.64 Conduit

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** If using the QPL, be sure to verify appropriate means of acceptance, see applicable Acceptance Code within the QPL.

- a. Galvanized conduit shall be accepted on receipt of "SATISFACTORY" test reports from State Materials Laboratory for each size and shipment. Each sample requires two 12-inch sections, one from each end of a standard length of conduit. Re-sampling, when directed, requires twice the number of pieces specified. Be sure that matching end pieces are identified.

The Project Engineer may accept galvanized conduit based on nondestructive testing according to the FOP for ASTM D 1186.

- b. Fiber reinforced plastic, flexible, and plastic conduit shall be accepted on Manufacturer's Certificate of Compliance or on catalog cuts.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for Underwriters approval labels. Check for damage to coatings in shipping and handling, and see that damaged areas and field cut threads are protected with an approved coating.
5. **Specification Requirements:** See *Standard Specifications* Section 9-29.1. Review contract documents to determine if supplemental specifications apply.

9-4.65 Electrical Conductors

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071). A sample shall consist of 15 feet.
3. **Acceptance:** Conductors shall be accepted upon receipt of "Satisfactory" Test Report from State Materials Laboratory.

- a. **Single Conductors:** If using the QPL, be sure to verify appropriate means of acceptance, see applicable Acceptance Code within the QPL. For wire manufacturers not listed in the QPL, submit a sample. A sample shall be a length of wire that shall include the complete printed/stamped designation: manufacturer, size, and insulation type.
 - b. **Multiple Conductors:** If using the QPL, be sure to verify appropriate means of acceptance, see applicable Acceptance Code within the QPL. For wire/cable manufacturers not listed in the QPL, submit a sample. A sample shall be a length of wire that shall include the complete printed/stamped designation: manufacturer, size, and insulation type.
 - c. **Fiber Optic Cable.** A sample of the Fiber Optic cables shall be a minimum 2 feet long.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. A visual inspection shall be made to ensure that no conductors with damaged insulation are incorporated into the project.
5. **Specification Requirements:** See *Standard Specifications* Section 9-29.3. Review Contract Documents to determine if supplemental requirements apply.

9-4.66 Signal, Luminaire, ITS, and Strain Poles

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification. Notify Materials Fabrication Inspection Office of need to provide Inspection Services.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** The fabricated poles and associated hardware will be accepted on the basis on an "Approved for Shipment" tag or stamp (figure 9-8). If poles were inspected prior to shipment to job site, they will be stamped "APPROVED FOR SHIPMENT" (Figure 9-4) An "F" or "D" will be stamped to indicate the steel or iron is of foreign or domestic origin. Certificate of Material Origin will be the responsibility of the project office. Poles not inspected prior to shipment must be inspected and approved at the job site by the Materials Fabrication Inspection Office prior to installation. Acceptance will be based on approved shop drawings per Chapter 8-20.2B of this manual and Mill Test Certificates supplied by the manufacturer.

Certificates of Material Origin will be the responsibility of the project office.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for "APPROVED FOR SHIPMENT" stamp (Figure 9-4) and the "F" or "D" indicator for foreign or domestic steel and document it. Check for damage due to shipping, handling and erection. Arrange for inspection if not tagged.

5. **Specification Requirements:** See *Standard Specifications* Section 9-29.6. Review contract documents to determine if supplemental specifications apply.

9-4.67 Anchor Bolts for Luminaire, Signal Poles, and Sign Structures

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification. Notify Materials Fabrication Inspection Office of need to provide Inspection Services.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071)
3. **Acceptance:** Acceptance may be based on "APPROVED FOR SHIPMENT" tag and/or stamp (Figure 9-4 or 9-5). An "F" or "D" will be stamped to indicate if the steel or iron is of foreign or domestic origin. Certificate of material origin will be the responsibility of the project office.

The ID number on the tags that is attached to the bundles of anchor bolts will be stamped on a representative number of anchor bolts.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check and record the "APPROVED FOR SHIPMENT" tag and/or stamp (Figure 9-4 or 9-5) and the "F" or "D" indicator for foreign or domestic steel and document it. Check for damage due to shipping and handling.

Note: Special attention shall be placed on the proper installation of bolts. No adjustments (bending) of bolts will be allowed after placement in concrete.

5. **Specification Requirements:** See *Standard Specifications* Section 9-29.6(5). Review contract documents to determine if supplemental specifications apply.

9-4.68 Luminaires and Lamps

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification
2. **Preliminary Samples:** Preliminary samples will be required only if requested on Request for Approval of Material (DOT Form 350-071). Submit Manufacturers Certificate of Compliance and catalog cut to the State Materials Laboratory for evaluation if requested.
3. **Acceptance:** Verify the materials received on the job site, is in fact the same make, model, lot, batch, size, color, blend, etc. as approved for use, be it by QPL or via the Request for Approval of Material (DOT Form 350-071).

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual.

- a. **Luminaires:** A visual inspection shall be made to ensure damaged equipment is not installed and that luminaires are mounted level. Confirm the socket position is the same as that noted on the catalog cut.
- b. **Lamps for Luminaires and Signal Heads:** Check that all lamps are of the proper wattage, see contract documents.

5. **Specification Requirements:** See *Standard Specifications* Section 9-29.10. Review contract documents to determine if supplemental specifications apply.

9-4.69 Water Distribution System

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification. If approval action is being requested via the RAM process, attach Catalog Cuts or other appropriate documents, using proper transmittal, to assist RAM Engineer in the approval process.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** The water distribution material, when approved as noted above, may be accepted in the field by verifying that the materials placed on the job are the same make model, lot, batch, size, color, blend, etc. that was, in fact, approved. In addition, the following: materials will need appropriate documentation and transmittals as noted below.

- a. Ductile Iron Pipe - Manufacturer's Certificate of Compliance
- b. Steel Pipe (4 inches and under) – Manufacturer's Certificate of Compliance
- c. Steel Pipe (6 inches and larger) – Manufacturer's Certificate of Compliance
- d. Polyvinyl Chloride (PVC) Pipe (4 inches and over) – Manufacturer's Certificate of Compliance
- e. Polyvinyl Chloride (PVC) Pipe (4 inches and under) – Manufacturer's Certificate of Compliance

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check material delivered to the project for damage to the galvanized coatings in shipping and handling and conformance to the contract documents. See that damaged areas and field cut threads are protected with an approved galvanized repair paint formula, standard formula A-9-73. Water distribution pipe requires testing after installation in conformance with the *Standard Specifications* Section 7-11.3.

5. **Specification Requirements:** See *Standard Specifications* Section 9-30. Review contract documents to determine if supplemental specifications apply.

9-4.70 Elastomeric Bearing Pads

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071).

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Material may be accepted on a Manufacturer's Certificate of Compliance accompanied by a certified test report identifying the specific batch of material and conforming to AASHTO M251.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Make certain that material to be used is from the certified batch.

5. **Specification Requirements:** See *Standard Specifications* Section 9-31. Review contract documents to determine if supplemental specifications apply.

9-4.71 Fabric Bearing Pad

1. **Approval of Material:** Approval is required for the fabricator of the bearings prior to the start of fabrication. For approved plants in Washington State, or the need for inspection, contact the Materials Fabrication Inspection Office.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** All Fabric Bearing Pads need to be inspected at the point of manufacture prior to shipping.

Documentation will be checked and accepted by WSDOT Fabrication Inspection at the point of manufacture. Certification will be maintained by Fabrication Inspection office. An "F" or "D" will be stamped to indicate the steel or iron is of foreign or domestic origin.

Certificate of Material Origin will be the responsibility of the project office.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check and record the "APPROVED FOR SHIPMENT" tag and/or stamp (Figure 9-4 or 9-5) and the "F" or "D" indicator for foreign or domestic steel and document it. Check for damage caused by shipping and handling.

5. **Specification Requirements:** Review the contract documents to determine the specification requirements.

9-4.72 Precast Concrete Barrier and Wall Panels

1. **Approval of Material:** Approval of fabricator is required prior to the start of fabrication. Materials will be approved by the Request for Approval of Material (DOT Form 350-071). Notify Fabrication Office of need to provide Inspection Services, or to verify that the precast plants annual review and approval is current for wall panels only.

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Accept only barrier sections that are stamped “WSDOT INSPECTED” (Figure 9-3). Accept only wall panels, which are stamped “APPROVED FOR SHIPMENT” (Figure 9-4). An “F” or “D” will be stamped to indicate the steel or iron is of foreign or domestic origin. Certificate of Material Origin will be the responsibility of the project office. The “WSDOT INSPECTED” stamp on barrier will include the connecting pins, which will be inspected at the barrier fabricator’s facility.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for shipping and handling damage. Check for “APPROVED FOR SHIPMENT” stamp or “WSDOT INSPECTED” stamp and the “F” or “D” indicator for foreign or domestic steel and document it.
5. **Specification Requirements:** See *Standard Specifications* Section 6-10, 6-02.3(25), and 6-02.3(28). Review contract documents to determine if supplemental specifications apply.

9-4.73 Safety Bars, Cattle Guards, Sign Mounting Brackets, Steel and Special Guardrail Posts, Steel Sign Posts

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If fabrication or welding of the item is needed, contact the Materials Fabrication Inspection Office for disposition and possible inspection.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Materials may be accepted on receipt of Manufacturer’s Certificate of Compliance for the base metal including Mill Test Certificates.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check each lot of material delivered to the project for damage, and that accompanying Manufacturer’s Certificate of Compliance is present. Check galvanizing using procedures stated in FOP for ASTM D 1186. Identify lots with test reports. Check for handling or shipping damage.
5. **Specification Requirements:** See *Standard Specifications* Section 9-05.18, 9-16.3(2), 9-28.14(2) and *Standard Plans*. Review contract documents to determine if supplemental specifications apply.

9-4.74 Metal Bridge Rail

1. **Approval of Material:** Approval of fabricator is required prior to the start of fabrication. Materials will be approved by the Request for Approval of Material (DOT Form 350-071). Notify Fabrication Office of need to provide Inspection Services.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** If rails were inspected prior to shipment to job site, they will be stamped or tagged “APPROVED FOR SHIPMENT” (Figure 9-4 or 9-5). An “F” or “D” will be stamped to indicate the steel or iron is of foreign or domestic origin. Certificate of Material Origin will be the responsibility of the project office. If not, rails must be inspected on job site by the Materials Fabrication Inspection Office prior to installation. Acceptance will be based on approved shop drawings per Chapter 8-20.2B of this manual, Mill Test Certificates supplied by the manufacturer.
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for “APPROVED FOR SHIPMENT” tags or stamp and the “F” or “D” indicator for foreign or domestic steel and document it. Check for damage caused by shipping and handling. Unless aluminum parts have been adequately wrapped, there may be damage to anodic and lacquer coating. Damaged parts shall be rejected.
5. **Specification Requirements:** See *Standard Specifications* Section 6-06.3(2). Review contract documents to determine if supplemental specifications apply.

9-4.75 Construction Geotextiles

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:**
 - a. Satisfactory test reports from the State Materials Laboratory when quantities exceed the limits stated in *Standard Specifications* Section 9-33.4(4). Sample per WSDOT Test Method 914. A Manufacturer’s Certificate of Compliance MUST accompany all samples submitted for testing.
 - b. Acceptance may be on Manufacturer’s Certificate of Compliance when quantities are within the limits stated in *Standard Specification* Section 9-33.4(4).
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check each roll of geotextile fabric for proper identification as shown on either the Manufacturer’s Certificate of Compliance or on the State Materials Laboratory test report.

5. **Specification Requirements:** See *Standard Specifications* Sections 9-33. Review contract documents to determine if supplemental specifications apply.

9-4.76 Concrete

1. **Approval of Material:** Approval of all materials is required prior to use.

Cement – see Section 9-4.1

Fine Aggregate (sand) – see Section 9-4.4

Coarse Aggregate – see Section 9-4.4

Admixtures for Concrete – see Section 9-4.58

Water – see Section 9-4.77

Contractor must submit a concrete mix design on DOT Form 350-040. All concrete except commercial and Lean Concrete must come from a pre-qualified Batch Plant. Contact the Regional Materials Engineer to determine if plant is pre-qualified.

For mix designs proposed for cement concrete pavement the contractor is required to submit flexural and compressive strength test results in accordance with Section 5-05 of the *Standard Specifications* as part of the concrete mix design.

Note: If the Aggregate Sources Tacking System requires Alkali Silica Reaction (ASR) mitigation the concrete mix design submittal may include the use of either a low alkali cement per Section 9-01.3(3), or fly ash per 9-23.9, as approved by the Engineer. The contractor shall provide test results for ASTM C 1260 or AASHTO T 303 showing the mitigating measures are effective (see Section 9-03 of the *Standard Specifications*). Contact the General Materials Engineer of the State Materials Laboratory or the State Bridge Construction Engineer if the contractor is proposing to use other mitigating measures.

2. **Preliminary Samples:** Not Required

3. **Acceptance:**

a. **Commercial and Lean Concrete:** Is accepted based on a Certificate of Compliance to be provided by the supplier as described in Section 6-02.3(5) B of the *Standard Specifications*.

b. **Cement Concrete Pavement:** Is accepted based on satisfactory field tests for air content and compressive strength (see Section 9-5 of this manual for testing frequency).

c. **Structural Concrete:** Is accepted based on tests for Slump, Air Content, Compressive Strength, and Temperature (see *Standard Specifications* Section 6-02.3(5)G for testing frequency).

4. **Field Inspection:** The concrete mix provided shall match the mix the contractor submitted for review. The Mix design submittal shall include the Aggregate Correction Factor to be used in determining the Air Content, if the contractor fails to provide this information on DOT form 350-040 do not apply an aggregate correction factor.

5. **Specification Requirements:** See *Standard Specifications* Section 9-03.1, 5-05 and 6-02.

9-4.77 Water for Concrete

1. **Approval of Material:** Not required.

2. **Preliminary Samples:** Not required.

3. **Acceptance:** Is based on test results provided by the contractor. If the Contractor is using potable water that is clear and apparently clean, then no testing is required.

a. **Physical Requirements:** conducted on a weekly interval for the first four weeks and thereafter on monthly interval.

b. **Chemical Requirements:** conducted on a monthly interval.

4. **Field Inspection:** See Section 9-4.75 concrete.

5. **Specification Requirements:** See *Standard Specifications* Section 9-25.1.

9-4.78 Expansion Joints

1. **Approval of Material:** Approval is required for the fabricator and all material components of the expansion joints prior to the start of fabrication. Materials will be approved by the Request for Approval of Materials (DOT Form 350-071).

2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).

3. **Acceptance:** Expansion joint systems containing steel will be inspected by Fabrication Inspection at the jobsite.

All gland material will be accepted based on Manufacturer's Certificate of Compliance. Manufacturer's Certificates of Compliance for steel as well as the gland material will be approved and maintained by the project office. Certificates of Material Origin will be the responsibility of the project office. Expansion joints acceptable to the Fabrication Inspector will be stamped "WSDOT INSPECTED".

The Project Engineer shall collect all of the documentation from the fabricator for the various material items used in the Manufacturing of the expansion joints as listed below.

a. Gland Strip — Manufacturer's Certificate of Compliance

b. Steel Plates and shapes including — Manufacturer's Certificate of Compliance and Certificate of Material Origin.

c. Coatings for steel parts — Manufacturer's Certificate of Compliance

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Check for damage caused by shipping and handling.

5. **Specification Requirements:** Review contract documents to determine if supplemental specifications apply.

9-4.79 Controller Cabinet Assembly

1. **Approval of Material:** Approval of all components in the Controller Cabinet Assembly are required. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the individual components will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Final acceptance is based on a satisfactory test report. A satisfactory test report is defined as acceptable performance in the following tests:
 - WSDOT Test Method 421, Traffic Controller Inspection and Test Procedure
 - WSDOT Test Method 422, Transient Voltage Test (Spike Test) Procedure
 - WSDOT Test Method 423, Conflict Monitor Testing
 - WSDOT Test Method 424, Power Interruption Test Procedure
 - WSDOT Test Method 425, Environmental Chamber Test
 - WSDOT SOP 429, Method for Determining the Acceptability of Traffic Signal Controller Assembly
 - WSDOT Test Method T427, Loop Amplifier Test
 - WSDOT Test Method T428, Compliance Inspection and Test Procedure
4. **Field Inspection:** Field verify per Section 9-1.5C of this manual. Verify the controller cabinet assembly received on the job site, has satisfactory test reports if required. Check for damage due to shipping and handling.
5. **Specification Requirements:** See *Standard Specifications* Section 9-29.13. Review contract documents to determine if supplemental specifications apply.

9-4.80 Miscellaneous Temporary Erosion and Sediment Control Items

1. **Approval of Material:** Approval of materials is required prior to use. Materials will be approved by the Qualified Products List or Request for Approval of Material (DOT Form 350-071). If approval is by QPL, be certain to verify that the product is in fact qualified for its intended use, and the product is listed under the appropriate specification.
2. **Preliminary Samples:** A preliminary sample of the material will be required only if requested on Request for Approval of Material (DOT Form 350-071).
3. **Acceptance:** Material will be accepted by visual inspection. The exception to this will be Geotextile for Silt Fence, which will be accepted on basis of Manufacturer's Certificate of Compliance.

4. **Field Inspection:** Field verify per Section 9-1.5C of this manual.

5. **Specification Requirements:** See *Standard Specifications* Sections 8-01, 9-14, and 9-33.

9-4.81 Concrete Patching Material

1. **Approval of Material:** Approval of materials is required prior to use. This approval may either be by virtue of the inclusion of this material/product on the Qualified Products List or by approval of a Request for Approval of Material (DOT Form 350-071). If approval is by means of QPL, be certain to verify that product is in fact qualified for its intended use, and the product is listed under the appropriate specification. If the product is not listed on the QPL, submit test data from an accredited independent laboratory confirming that the concrete patching material meets specifications of Section 9-20.
2. **Preliminary Samples:**
 - A. **Prepackaged Concrete Patching Material:** If the concrete patching material is not on the QPL, submit test data from an accredited independent laboratory confirming that the concrete patching material meets the requirements of *Standard Specification* Section 9-01.2.
 - B. **Aggregate for Extension:** A preliminary sample of the material will be required only if requested on the Request for Approval of Material (DOT Form 350-071) or if the ASA database indicates that the aggregate source approval has expired. Contact the State Materials Office if preliminary samples are required. Preliminary samples for Concrete Aggregate shall be made up of 50-100 pounds of clean, washed coarse aggregate and 20-25 pounds of clean washed fine aggregate. The samples are to be shipped in increments, using satisfactory containers, not exceeding 30 pounds.
3. **Acceptance:**
 - A. The Contractor must submit a mix design meeting the requirements of *Standard Specification* 9-20 for the concrete patching material.
 - B. Acceptance for the aggregate extender shall be based on the material coming from an approved source, and a satisfactory gradation report supplied with the mix design.
4. **Field Inspection:** Field Verify the prepackaged patching material received on the job site is in fact the same as approved for use, be it by QPL or via the Request for Approval of Material (DOT Form 350-071). Verify that the amount of added water and aggregate extender complies with the contractors mix design.
5. **Specification Requirements:** See *Standard Specifications* Section 9-20. Review contract documents to determine if supplemental specifications apply.

9-5 Guidelines for Job Site Control of Materials

9-5.1 General

When in doubt as to sampling requirements, refer to Record of Materials, (ROM), Request for Approval of Material, (RAM), and Chapter 9-4 of this manual. All items for acceptance, except for sampling and testing PCC cores, testing concrete cylinder and cement and as shown in Chapter 9-5.7 of this manual will be sampled and tested by the Project Engineers representative.

In some instances, certain items usually sampled by Project Engineers representative may be sampled and tested by representatives of the State Materials Laboratory or other representatives. Such items as shown in Chapter 9-1 of this manual, when properly identified with an “Approved for Shipment” tag, may be accepted for use by the Project Engineer without any further sampling or testing.

9-5.2 Sampling and Testing Schedule

9-5.2A General

The intent of sampling and testing is to ensure that the material provided to the project conforms to the specifications. The frequency schedule in Chapter 9-5.7 of this manual covers the minimum requirements for sampling and testing at the project level. The Project Engineer is responsible for obtaining the number of samples necessary to ensure adequate control of the material being produced under the circumstances and conditions involved with the particular project. In some instances, good construction practice will necessitate more frequent tests to ensure adequate control of the quality of production. This will be the case where production is just getting under way, where source material is variable or marginal in quality. Also operations from commercial sources when small lots of material are being sampled (as for barge loads of aggregate) or when stockpiles are built and depleted may require more frequent sampling and testing.

The instructions listed in Chapter 9-5.7 of this manual, will be followed in the production of those surfacing materials covered therein. A minimum of one acceptance test is required except for small quantities as shown in Chapter 9-5.2C of this manual.

9-5.2B Reducing Frequency of Testing

In instances of uniform production where the material is running well within specification limits, the Project Engineer may initiate deviations from the schedule. Deviations exceeding a 10 percent reduction will require approval from the Construction Materials Engineer at the State Materials Laboratory and must be documented in the project records, and fully explained by the Project Engineer. Lack of personnel, equipment, and facilities will not be considered sufficient reasons for such deviation.

Authority for approval of frequency reduction may be delegated to the Regional Materials Engineer upon request. This authority may permit overall reduction of sampling frequency or selective relief of selected test properties.

Examples of selective relief would be reduction/elimination of fracture determinations for production from quarry sources or reduction of frequency for sand equivalent determination. As a general principle, frequency reduction may be considered whenever five consecutive samples taken at the normal frequency indicate full conformance with the specifications.

9-5.2C Sampling and Testing for Small Quantities of Materials

The Project Engineer may elect to accept small quantities of materials without meeting minimum sampling and testing frequencies using the following criteria.

An item can be accepted as a small quantity if the proposed quantity for a specific material is less than the minimum required frequency. For mainline paving, less than one-half the required frequency as defined in Chapter 9-5.7 of this manual.

Materials that will not be considered under the small quantity definition are:

Structural Concrete

Some issues that the Project Engineer may consider prior to use of small quantity acceptance are:

Has the material been previously approved? Is the material certified? Do we have a mix design or reference design? Has it been recently tested with satisfactory results? Is the material structurally significant?

Small quantity acceptance could be visual, by certification, or other methods. Acceptance of small quantities of materials by these methods must be documented. Documentation of materials under these methods must be provided by the Project Engineer or representative accepting the material. For visual documentation, an entry should be made in the project records as to the basis of acceptance of the material, and the approximate quantity involved.

The small quantity acceptance may be used for any quantity of the following uses:

Curbs and Sidewalks, Driveways, Road approaches, Paved ditches and slopes

9-5.2D Reference Test Report

When a Satisfactory Test Report is required, a Referenced Test Report may be used if allowed in Section 9-4 for a specific material. A Reference Test Report as listed below will not be allowed for HMA Mix Designs, or other materials unless allowed per Section 9-4.

A Reference Test Report may consist of one of the following:

- A copy of a previous WSDOT Satisfactory Test Report generated under another contract number as long as the manufacturer and lot number of the material to be used are the same as the material the test report represents.
- A printed copy of the electronic QPL database page showing ‘referenced’ lots previously tested. The lot number in the QPL must match the lot number of the material used. The information will be listed in the ‘description’ field for specific materials in the QPL.

All Referenced Test Reports must reflect the same specification as the material to be used and be received prior to installation of the intended material. A Reference Test Report for material can only be used in the same calendar year for when the material was incorporated into the contract.

9-5.3 Point of Acceptance

State Owned Source: Material produced from State owned source may be accepted either as it is placed into stockpile or as it is placed in hauling vehicles for delivery to the roadway. The sampling and testing frequency during stockpiling shall be in conformance with Chapter 9-5.7 of this manual.

In the event sample testing during stockpiling shows the material to be marginal (i.e., within tolerance limits) in any specification requirement, acceptance at this point shall be conditional and dependent on adherence to specifications at the time of removal from stockpile.

Contractor's Source: If stockpiled material is set aside exclusively for use on WSDOT projects it may be accepted the same as that for a state-owned source. If stockpiles are constructed for general use, then materials for WSDOT projects shall be tested for acceptance from samples taken by the Project Engineer representative in accordance with WSDOT FOP for AASHTO T 2. The Engineer will determine the exact point of acceptance. If an existing stockpile was built without acceptance testing during material production, and later set aside exclusively for use on state projects, the material may be accepted with appropriate test results from samples taken by the Project Engineer representative in accordance with WSDOT FOP for AASHTO T 2. The sampling and testing frequency shall conform to Chapter 9-5.7 of this manual.

9-5.4 Basis for Acceptance

The basis of acceptance of Hot Mix Asphalt and aggregates may be either by statistical evaluation or non-statistical evaluation methods. The method to be used is specified in *Standard Specifications* or Contract Documents.

The testing tolerances shown in Chapter 9-5.6 of this manual apply exclusively to the appropriate specifications as listed in the *Standard Specifications*. These tolerances do not apply to those "special" materials having requirements differing from those listed in the *Standard Specifications*. For these "special", materials usually described in the contract documents, tolerances will be provided by the State Materials Laboratory upon request from the Regional Construction Manager.

Material that has been produced prior to rejection (i.e., HMA in storage silo, crushed materials hauled to the job site) may be incorporated into the project provided the Contractor is made fully aware that the material may be subject to a price adjustment or, in extreme cases, to total removal. Every effort shall be made to place this material in structurally noncritical areas such as shoulders or gore areas.

All material produced between the time of rejection and the time an acceptable material is produced, as defined by WSDOT adopted testing procedures, shall not be incorporated in the work in any manner until it meets specifications.

9-5.4A Basis for Acceptance — Statistical Evaluation

For materials being accepted using statistical evaluation procedures, random samples will be evaluated to determine quality level within a defined tolerance band. Acceptance, bonus, and disincentive procedures are defined in the contract documents.

Test results with acknowledged errors or equipment deficiencies are to be immediately discarded without recourse and another sample run.

Test results for Hot Mix Asphalt may be challenged by the Contractor, as defined in the *Standard Specifications* Section 5-04.3(8)A. These specifications allow the Contractor to challenge results of any individual acceptance sample test in writing and within 5 working days from receipt of the specified test results.

When the Contractor challenges a test, a split of the original field sample must be tested by different equipment and a different qualified tester. It therefore is necessary that a split of every field sample (i.e., opposite quarter from acceptance test) be saved in a secure area, accurately marked, and be available for challenge sample testing. The specifications require that the challenge sample testing be done in the Regional Materials Laboratory or the State Materials Laboratory. When the Contractor makes a challenge it is expected that the split sample be sent and tested as quickly as possible. This will require that testing of these samples be prioritized. By expediting the challenge sample testing, problems that may exist in testing or with the material being produced can be identified and corrected lessening the impact to both the Contractor and WSDOT.

9-5.4B Basis for Acceptance — Non-Statistical Evaluation

If statistical acceptance procedures are not specified nonstatistical acceptance method will be used.

Individual samples taken for acceptance by this method may be subject to certain tolerances allowed outside the established value stated in the *Standard Specifications*. The tolerance acceptance procedures shall be followed in these cases. Test results with acknowledged errors or equipment deficiencies are to be immediately discarded without recourse and another sample run.

When the test results for Hot Mix Asphalt fall outside the control points the material will be evaluated according to the *Standard Specifications* Section 5-04.5(1)A.

9-5.4C Basis for Acceptance — Asphalt Binder

The basis for acceptance of asphalt binder is compliance with existing specifications as modified to include the tolerance as follows:

1. If a binder sample fails to meet the required specifications, the binder samples prior and subsequent to the failed sample will be tested. Samples of asphalt binder will continue to be tested until samples taken both prior and subsequent to the failing samples meet the specifications.

The quantity of out of specification HMA is determined from the tons of HMA represented by each of the asphalt binder samples that failed to meet the specifications.

2. If a binder sample does not meet the specifications but is not more than 10 percent outside the specification limits and the binder sample prior and subsequent to the out of specification binder both meet the specifications, there will be no price adjustment.
3. If the binder sample is more than 10 percent out of specification or if the binder sample is less than 10 percent out of specification and either the binder sample prior or subsequent to does not meet the specifications, the HMA will be rejected.

9-5.4D Basis for Acceptance — Other Aggregate Properties

The basis for acceptance of aggregates prior to completion of the placement of the material is compliance with existing specifications as modified to include tolerances Established in Chapter 9-5.6 of this manual. The application of these tolerances shall be as follows:

1. Take the following actions any time a sample falls outside the specification limits, but within tolerance bands:
 - a. Immediately take two separate additional samples representing current production in accordance with Chapter 9-4 of this manual. The contractor has the option of making plant adjustments prior to taking these samples.
 - b. Production will be accepted until the second sample is checked for properties that were out of specification in the first sample.
 - c. Do not accept any additional material if the second sample is also out of specification.
 - d. If the second sample is within specification, immediately check the third sample. Do not accept any additional material if the third sample is out of specification.
 - e. No further material will be accepted after the time of rejection until corrections are made in the operations. This will be confirmed by new tests within specification limits.
 - f. Basis for acceptance after this correction will be in conformity with the procedure outlined above. All tests of material outside the specification limits must be listed and justified on the materials certification as required by Chapter 9-1.5 of this manual.
2. The acceptance of material shall cease with one or more of the following conditions:
 - a. When a sample falls outside of the applicable tolerance bands.
 - b. When any two out of three consecutive samples are within tolerance bands, but outside specification limits.
 - c. When any sample has a gradation that falls within both the high and low tolerance bands.

d. Any sample where the material is outside the specification limits, but within the tolerance bands, in any two of the following properties:

- Gradation
- Fracture
- Sand Equivalent
- Flat and Elongated
- Uncompacted Void Content of Fine Aggregate (Fine Aggregate Angularity)

The basis for acceptance of aggregate when all of the material has been placed on the project prior to completion of the testing is compliance with the existing specifications (no tolerances). Materials that are not in compliance with the specification will be evaluated as defined in 1-2.8C(1) Defective Materials for Material in Place.

9-5.5 Testing Staff Qualifications and Independent Assurance Program

9-5.5A Testing Staff Qualification

9-5.5A(1) General

WSDOT personnel assigned with testing construction materials will be enrolled in the Construction Tester Qualification Program. The details of this program are contained in this section. This program establishes uniform testing procedures, insures that testing staff is qualified in performing the testing procedures, and provides a regular review. The review process, through inspection by the Region Independent Assurance Inspector (IAI) evaluates the performance of all testing staff, recognizes proficient performance, and improves substandard performance by recommending corrective action. The qualification program extends the State Materials Laboratory accreditation principles. This includes the assignment, management, and review of project level testing using elements of the State Materials Laboratory accreditation program to accommodate an interface with region and, project level materials testing operations and the use and understanding of national standard test procedures such as AASHTO and ASTM, and other test procedures such as WAQTC and WSDOT.

9-5.5A(2) Construction Tester Qualification Rules

1. **Responsibility:** The construction tester qualification program requires detailed and specific attention to be paid to the testing procedures involved: The State Materials Engineer will address and resolve policy issues related to the qualification program.
2. **Qualification Modules:** The construction tester qualification modules have been set up in 5 areas of testing that represent most of the acceptance tests performed. The project acceptance testers will be evaluated for their proficiency in one or more of the construction tester qualification modules. Each module has a defined list of test procedures in which proficiency is evaluated, see Section 9-8 of this manual. The modules are listed as follows:

- Aggregates
 - Hot Mix Asphalt
 - Structural Concrete
 - Embankment and Base Density
 - Hot Mix Asphalt Density
3. **Qualification Categories:** The tester can be qualified in one or more of three categories. The qualification categories are:
- a. **Module Qualified Tester:** Fully proficient in a testing module, normally works independently with only general supervision and is responsible for determining material compliance.
 - b. **Individual Method Qualified Tester:** Has proficiency in one or more test procedures which may partially encompass methods in the qualification modules, but also extends to other infrequent acceptance procedures performed at the project level, and includes tests performed at the Regional or State Materials Laboratories.
 - c. **Interim Qualified Tester:** Basically proficient in one or more tests but limited to an interim period of in training work. Works under the close supervision of a module or individual method qualified tester, refer to Paragraph 5 below.
- Testing personnel at the Region may be either Module Qualified, Individual Method Qualified, or Interim Qualified Testers. Per the AASHTO accreditation, the State Materials Laboratory personnel are Individual Method Qualified Testers.
4. Attaining Qualification:
- a. **Module Qualified Testers:** To become a Module Qualified Tester the tester shall satisfactorily complete the required written tests and proficiency evaluations by the IAI, the Region Construction Trainer, or materials staff under the direction of the Materials Engineer in a field or region laboratory for one or more modules in the construction tester qualification program.
 - b. **Individual Method Qualified Testers:** To become a Individual Method Qualified Tester the tester shall satisfactorily complete the proficiency evaluation by the IAI, the Region Construction Trainer, or materials staff under the direction of the Materials Engineer. This can be accomplished in a field or region laboratory or State Materials Laboratory. Their qualification records reflect proficiency in the specific individual test methods.
 - c. **Interim Qualified Testers:** To become an Interim Qualified Tester, the following conditions have to be met:
 - (1) Individual study of the written test method(s) for a complete module,
 - (2) Test demonstration by a proficient tester,

- (3) Allowance for practice or trial tests,
- (4) Successful completion conforming to testing checklist(s) without coaching, and
- (5) The Interim Qualified Tester works under close supervision by a Module or Individual Method Qualified Tester who is qualified in the same tests.

The conditions as described above, leading to interim qualification, may be conducted by another tester currently qualified in the module or test concerned. Based on evaluation of prior experience by the supervisor, with concurrence of the region IAI or Region Construction Trainer, a non-qualified tester may be considered to have the equivalent of conditions 1 through 3 above. An individual will be considered an interim qualified tester when successful testing performance conforming to the checklists has been completed in the presence of another qualified tester.

5. **Supervision of Interim Qualified Testers:** An Interim Qualified Tester works under the close supervision of a Module or Individual Method Qualified Tester that is qualified in the same test or module containing the test. Close supervision means that the Module or Individual Method Qualified Tester is physically present when the Interim Tester performs the test. The Module or Individual Method Qualified Tester must review and endorse all test results and determinations of material conformance.
6. **Criteria for Evaluating Performance:** Satisfactory performance constitutes performance conforming to the method checklist or with limited deviations corrected on the spot. Unsatisfactory performance consists of repeated infractions from previous evaluations, or incorrect performance of individual critical items on the checklist. Unsatisfactory evaluations shall be subject to region review.
7. **Qualification of Evaluating Staff:** Staff participating in evaluation of testers for qualification operate under the professional responsibility of the Regional Materials Engineer, and are not themselves required to be qualified testers.
8. **Frequency of Equipment Verification:** Regional laboratory and field laboratory test equipment will be verified annually, usually during the first quarter of the year, utilizing State Materials Laboratory equipment verification criteria. A tag bearing the year the verification expires will identify verified equipment.
9. Test procedures that are not included in the testing modules, shall be considered infrequently performed test procedures and shall be individual method qualified. For those procedures the Regional Material's Engineer, or his designated representative, will insure that the following process is employed in carrying out the procedure:
- a. The employee responsible for performing the test will study the test method, after first determining that the procedure is the applicable current version.

- b. The necessary test equipment will be assembled and confirmed as to its suitability and verification if required.
 - c. The employee will review how to conduct of the test with the supervisor and clarify any questions.
 - d. The test procedure will be performed in duplicate, using split portions of the test sample if possible. If not, a blank of other similar material will be run in duplicate prior to testing.
 - e. The results of the duplicate determination will be compared with the expected precision and bias determinations, if any, from the test procedure.
 - f. Lacking any defined basis of comparison, the results will be reported as the average of the two determinations with both the individual values and the average shown on the test report.
2. Annually, verify laboratory and field test equipment, using State Materials Laboratory equipment verification criteria. An attached tag will identify the verified equipment.
 3. Maintain staff qualification for all methods performed in the laboratory. Qualification shall be either by Module Qualified Tester or Individual Method Qualified tester.
 4. Respond to the findings of the review program by the State Materials Laboratory staff, modeled on AASHTO Materials Reference Laboratory (AMRL) inspection program. Such reviews shall be conducted at least biennially.
 5. With approval of the State Materials Engineer, a non-WSDOT contracting laboratories having an equipment calibration/verification policy, and a technician training and evaluation process meeting the requirements of AASHTO R-18 may be used to conduct acceptance testing. Documentation of equipment calibration/verification and tester qualification shall be maintained and available for review by the Contracting Agency upon request. The Contracting Agency may conduct an on site review of the laboratory facilities, witness the tester performing the tests, verify the testing equipment, and review records when deemed necessary.

9-5.5A(3) Personnel Qualification Policy

1. All personnel performing acceptance testing will be either Module Qualified, Individual Method Qualified, or Interim Qualified Testers.
2. Module or Individual Method Qualified Tester designated as responsible for the performance of an Interim Qualified Tester must be in close contact, which means that the Module or Individual Method Qualified Tester is physically present when the Interim Tester performs the test. The Module or Individual Method Qualified Tester must review and endorse all test results and determinations of material conformance.
3. The Tester Qualification Tracking System will identify each tester, their specialty, level of qualification, and the results of ongoing evaluations. The IAI shall be the responsible person within the region for the accuracy of the information contained in the Tester Qualification Tracking System.
4. On-the-job performance will be evaluated by the IAI, the Region Construction Trainer, or materials staff under the direction of the Materials Engineer using the qualification checklists. Noted deficiencies will be reported in writing to the tester and his/her supervisor.
5. Supervisor action is required for notations of unsatisfactory performance.
6. The region tester performance review Chapter 9-5.5A(9) will consider continued qualification of individuals noted as deficient in performance. The supervisor shall submit to the Regional Materials Engineer the corrective action taken for unsatisfactory performance.

9-5.5A(4) Laboratory Qualifications Policy

A region or other subordinate laboratory to be considered qualified shall meet the following conditions:

1. Identify all test methods performed on a regular basis. Methods must conform to those established by WSDOT for materials acceptance.

9-5.5A(5) Construction Tester Qualification Program

1. Qualifications:
 - a. **Module Qualified Tester:** Qualification in a module will require satisfactory completion of a written exam, followed by hands-on performance of testing procedures. Written examinations require an overall score of 70 percent, with not less than 60 percent on each method for satisfactory completion. Performance examination requires satisfactory performance in the presence of the Independent Assurance Inspectors, the Construction Trainers, or materials staff of all checklist steps, in sequential order, in each required method.
 - b. **Individual Method Qualified Tester:** Qualification in an individual method requires satisfactory completion of hands on performance of the testing procedures in the presence of the Independent Assurance Inspectors, the Construction Trainers, or materials staff. Performance examination requires satisfactory performance of all checklist steps, in sequential order.
 - c. **Interim Qualified Tester:** Qualification as an Interim Qualified Tester requires satisfactory completion of hands-on performance of the testing procedures in the presence of a qualified tester that is qualified in the same test or module containing the test. Performance examination requires satisfactory performance of all checklist steps, in sequential order.
2. Equivalent programs, i.e., American Concrete Institute (ACI) Certification, may be accepted for qualification where feasible. The State Materials Engineer will determine acceptance of alternate programs.

3. Qualification examinations will be administered by Region IAI supported by Regional Construction Trainers and Regional laboratory supervisors.
4. Performance qualification will be determined from correct performance of all steps, in sequence, based on testing checklists derived from WSDOT adopted test methods as listed in the Materials Manual
5. Failure of a qualification examination will allow for reexamination after a 3-day minimum period of preparation for retest.
6. Repeated failures will be referred to the candidate's supervisor for regional performance review.
7. Tester will continue to be qualified under the following conditions:
 - a. All unsatisfactory evaluations are resolved within 30 days.
 - b. The IAI evaluates the Tester any time during the next calendar year (January to December).
 - c. Testers that missed an annual demonstration of proficiency may be allowed to do acceptance testing for a 30-day period, if requested by the Project Engineer and approved by the IAI. An evaluation and checklist review by the IAI, the Region Construction Trainer, or materials staff under the direction of the Materials Engineer must be conducted within this 30-day period.
 - d. Any tester missing two consecutive yearly annual evaluations will be required to retake the written test and achieve a satisfactory IAI performance evaluation.

9-5.5A(6) Regional Materials Laboratory Responsibilities

The Regional Materials laboratories will:

1. Examine and qualify testers using the Independent Assurance Inspectors, the Region Construction Trainers, or regional materials staff as a primary resource.
2. Annually, verify regional laboratory and field laboratory test equipment, using State Materials Laboratory equipment verification criteria. A tag will identify the verified equipment.
3. Maintain staff qualification for all methods performed in the Regional Materials Laboratory. Qualification shall be either by Module Qualified or Individual Method Qualified
4. Insure that the IAI will be the responsible person within the region for the accuracy of the information contained in the Tester Qualification Tracking System.
5. Respond to the findings of the review program by the State Materials Laboratory Staff.
6. Perform testing of independent assurance samples and comparison samples using qualified staff and verified equipment, if the region has a qualified laboratory.

7. Support the Construction Tester Training Program for their region or in cooperation with other regions by providing training facilities.

8. **Support of construction program testing including:** density cores, nuclear gauge correlation and management, concrete 28-day cylinders (acceptance), density standards (Proctor and maximum density), and as needed, hot mix asphalt ignition furnace calibration.

9-5.5A(7) Project Engineer Responsibilities

The Project Engineer will:

1. Ensure that all personnel assigned the responsibility for testing materials are Module Qualified Testers, Individual Method Qualified Tester, or Interim Qualified Testers who work under close supervision of a Qualified Tester.
2. Provide an opportunity for on-the-job training, and/or mentoring of Interim Qualified Testers prior to assigning testing responsibilities.
3. Take corrective actions for unsatisfactory evaluations of Qualified Testers.
4. Advise the Regional Independent Assurance Inspector of changes in assigned testers, new testers needing qualification testing, and of follow up corrective actions.

9-5.5A(8) The State Materials Laboratory Responsibilities

The State Materials Laboratory will:

1. Attain and maintain AASHTO Accreditation of the Materials Quality System responding to the AASHTO Accreditation Program. The Materials Quality System shall include all test methods performed at the State Materials Laboratory.
2. Assist the Regional Materials Laboratories by providing standards and procedures derived from the Materials Quality System Manual for direct application to corresponding procedures in the Regional Laboratories.
3. Maintain testing standards and procedures in conformance with WSDOT, AASHTO, ASTM, and WAQTC.
4. As the departmental laboratory qualification authority, periodically review the performance and records of region and other subordinate laboratories for consistent practices in testing, equipment verification, and staff qualification.
5. Maintain examinations and checklists used to qualify all WSDOT testing personnel.
6. Provide oversight and coordination for establishment and revision of the qualification programs. Creation and revision of qualification program modules will be by a cross-functional work group.
7. Maintain Tester Qualification Tracking System computer program.
8. Provide guidance and prepare summary for annual report of Independent Assurance (IA) System performance.

9-5.5A(9) Tester Performance Review

1. The IAI, the Region Construction Trainer, or materials staff under the direction of the Materials Engineer reviews performance of all Module qualified, Individual Method Qualified, and interim qualified testers as provided under the IA process.
2. Such reviews are documented in the form of checklists reflecting the degree of conformance to the test procedure. Copies of the review are provided to the tester and to the tester's supervisor (normally the Project Engineer) at the conclusion of the review.
3. Remarks may be included to reflect commendable performance, attention to detail, cooperative attitude, or other performance beyond the expected norm. Satisfactory reports affirm tester proficiency and attest to proper operation of the materials acceptance process.
4. Expected satisfactory performance is that all steps of the checklist be performed correctly. However, incidences of single to several errors as isolated, first-time occurrences, which are acknowledged and corrected by on the spot, discussion with the IAI, also constitute satisfactory performance. (*Note:* Some procedures may have single steps of such criticality that their omission reflects unsatisfactory performance.)
5. Unsatisfactory performance constitutes repeated occurrences of previous on-the-spot corrections, incorrect performance of critical steps. IAI's may also assign unsatisfactory performance based on observed falsification of test reports, violations of safety, hazardous materials or nuclear materials security standards, or failure to provide proper care of equipment. The Regional Materials Engineer shall promptly review all unsatisfactory performance reports.
6. Reports alleging improper performance of test procedures may be originated by other parties to a construction contract such as contractors, subcontractors or suppliers. Such allegations must be submitted in writing, to the Project Engineer for review. Allegations must identify the specific test procedure and alleged omissions or commissions and contain the name and signature of the individual making the allegation. These reports will be investigated.

9-5.5A(10) Review Actions for Unsatisfactory Performance

1. The tester's supervisor is expected to review and act on all unsatisfactory performance reports.
2. For unsatisfactory performance, the Regional Materials Engineer will work with the Project Engineer for proposed corrective action. Mutual agreement on corrective action shall be documented by attachment to the performance report.
3. Unresolved reports shall be referred to the Regional Construction Manager.
4. Review of substandard performance shall afford the tester involved the opportunity for a personal appearance. In the case of written allegations of misconduct, the individual making the allegation shall also have the opportunity to

appear. The Regional Construction Manager shall review recommendation for corrective action. All findings related to allegations of misconduct shall be made in writing by the Regional Construction Manager.

9-5.5B Independent Assurance (IA) Program**9-5.5B(1) General**

The IA Program, through a combination of sampling and observation, is intended to determine the conformance of sampling and testing to the defined procedures. The Independent Assurance process is intended to verify procedures, confirm equipment verification, and, in some instances, obtain split samples (Independent Assurance Samples) for independent testing. These samples do not reflect on the specification conformance of the materials involved. IA evaluation will be on a system basis, focused on individuals testing activity rather than being project based on a sample frequency and materials quantity basis.

9-5.5B(2) Independent Assurance Inspector (IAI)

The Regional Construction Manager should assign a sufficient number of persons in each region to handle the program for independent assurance sampling, testing, and annual tester evaluation reviews. These IAIs should be under the direction of the Regional Materials Engineer and should be well trained and experienced in all phases of the work.

It will be the duty of the IAI to conduct the IA Program in accordance with the requirements of WSDOT. The IA program requires the evaluation of all materials testers, observation of the techniques used to run the field tests, determination of the verification status and condition of testing equipment in use, and procurement of appropriate Independent Assurance Samples. The IAI's should exercise tact and good judgment in securing maximum cooperation on the part of the testers and other project personnel. IAI's will conduct the examination process under the Construction Tester Qualification Program.

The Tester Qualification Tracking System will identify each tester, their specialty, level of qualification, and the results of ongoing evaluations. The IAI shall be the responsible person within the region for the accuracy of the information contained in the Tester Qualification Tracking System.

The IAI may normally have other materials related functions to perform in addition to the IA functions. Typically, these may include:

1. Conducting initial training to establish interim qualification.
2. Mentoring interim or newly qualified testers to enhance efficiency and confidence.
3. Assisting in or conducting testing and inspection training in concert with the Regional Construction Trainer.
4. Reviewing materials, test-related records, and forms.
5. Radiation Safety Officer
6. Inspection and Certification of Concrete production facilities.

9-5.5B(3) Independent Assurance Evaluations

It is essential that the IAI evaluate all project and region materials testers, observe the techniques of running the field tests, ascertain the verification status of testing equipment in use, and obtain the appropriate Independent Assurance Samples.

The frequency of Independent Assurance Inspections is managed by the IAI's. On-site evaluation by the IAI will be conducted at least once per calendar year, per module or test. The on-site evaluation will accrue the calendar year following qualification or requalification. The on-site evaluation shall include evaluation in all test methods in the applicable qualification module, or the individual method qualified tests. Tests included in a module but not evaluated on a project may be evaluated off-site, such as at the region laboratory. Additional visits are recommended based on the activity level of the individual tester. Further, additional evaluations may be required for follow up of deficient performance or for monitoring activities of Interim Qualified Testers.

Observations of performance and split sampling will be performed for hot mix asphalt and aggregate testing. Only observations of performance are required for testing of Portland cement concrete and for density testing.

Independent Assurance observations and evaluations will follow the Tester Qualification Checklists for the procedures involved. A copy of these checklists and observations will be provided to the Project Engineer upon request. Each observation will be cataloged to the tester that is observed, to maintain an ongoing account of his/her performance. A complete record should be made of the evaluation and sampling performed during this inspection, the personnel contacted, the testing equipment observed, and the suggestions or on-the-spot corrections that were left with job personnel. Observations other than test performance related to checklists are not normally considered in the evaluation of the individual tester, but may require action by management involved.

At the time of the Independent Assurance Inspection, where samples are required, the IAI will observe the initial sampling and participate in the sample splitting activity to ensure that an accurate split is obtained. The field split will then be tested, under observation. The split portion will be returned to the Regional Materials Laboratory and tested for comparison of results.

Additional separate comparison samples may be split by the field tester and forwarded to the Regional Materials Laboratory as initiated by the field tester or when directed by the IAI as follow up for observed deficient performance. This sample will be carefully split, identified as "Comparison Sample," show the tester's identity, and be forwarded to the Regional Materials Laboratory accompanied by the field test results.

All testing equipment involved will be examined for the presence of the required Region verification tags current for the present calendar year. In addition, evaluation of the condition of the equipment items is advised for determination of in service wear or damage.

9-5.5B(4) Evaluation of Independent Assurance Samples Testing

The companion tests of Independent Assurance Samples will be performed employing another qualified operator and set of verified testing equipment than that used for the field (acceptance) test results. When acceptance testing is performed at the Regional Materials Laboratory, the operators should be under the same degree of Independent Assurance oversight as for acceptance sampling performed in the field.

9-5.5B(5) Comparison of Independent Assurance and Acceptance Test Results

Independent Assurance results or comparison results will be compared with the acceptance results. Reports of the comparison of results will be provided to the Project Engineer and the Region IAI. Comments reflecting the degree of conformance will be entered in the remarks section of the report by the Regional Materials Engineer. The degree of conformance will be determined according to the deviation ranges noted below. Gradation test results will be compared only on specification screens.

Test	Normal Range of Deviation	Maximum Range of Deviation
Sand Equivalent	± 8 points	± 15 points
Fracture	± 5 percent	± 10 percent
Uncompacted Void Content of Fine Aggregate	± 1.0 percent	± 2.0 percent
Asphalt Binder Content (HMA&ATB)	± 0.3 percent	± 0.6 percent
Sieve Analysis — All Items: No. 4 sieve and larger	± 5 percent	± 8 percent
No. 6 sieve to No. 80 sieve	± 3 percent	± 6 percent
No. 100 sieve to No. 200 sieve	± 2 percent	± 4 percent

In the table above, "Normal Range" indicates an acceptable range of variation between test results and no action is required. Test results that fall in this category will be so indicated by the wording "normal deviation" on the independent assurance test reports.

Test results falling outside of the "Normal Range" but within the "Maximum Range," will be indicated by the wording "questionable deviation" on the independent assurance test reports. For deviations falling into this category, the Project Engineer or a representative shall review the original test report form, advise the responsible test operator of the deviation, and review the test procedure at the next opportunity. The IAI will take the same actions relative to the test operator in the region laboratory.

Test results exceeding the maximum range will be indicated by the wording "excessive deviation." For deviations falling in the excessive category, the Project Engineer or a representative will notify the IAI and/or Region Construction Trainer for their services in corrective action. Corrective action involving both the field tester and the region laboratory tester will include review of sampling procedures, sample splitting procedures, testing procedures, and testing equipment.

The Project Engineer will document actions and results of these investigations by a notation or attachment to the independent assurance sample test report. The Independent Assurance Inspector shall document the actions and results of these investigations on the individual's checklist evaluation with notations as to his/her findings in reviewing region lab procedures. Lacking any other actions, these results shall be considered in scheduling repeat evaluations of a tester and entered into the individual's qualification record. These may include comments or findings by the Region Construction Trainer.

The focus of Independent Assurance sampling is based on individual tester's activity and is not intended to provide independent assurance sample reports on all projects or on all materials on any particular project.

9-5.6 Tolerance Limits*Crushed Coverstone*

	Specification Limits	Tolerance Limits
% Passing ¾"	100	95-100
% Passing ⅝"	95-100	90-100
% Passing No. 4	20-45	16-49
% Passing No. 200	0-7.5	0-9.0
Sand Equivalent	40 Min.	35 Min.
Fracture	75% Min.	70% Min.

Crushed Screenings ¾" — ½" for B.S.T.

	Specification Limits	Tolerance Limits
% Passing 1"	100	95-100
% Passing ¾"	95-100	90-100
% Passing ½"	0-20	0-25
% Passing ⅜"	0-5	0-10
% Passing No. 200	0-1.5	0-2.0
Fracture	75% Min.	70% Min.

Crushed Screenings ⅝" — No. 4 or B.S.T.

	Specification Limits	Tolerance Limits
% Passing ¾"	100	95-100
% Passing ⅝"	95-100	90-100
% Passing No. 4	0-10	0-15
% Passing No. 10	0-3	0-7
% Passing No. 200	0-1.5	0-2.0
Fracture	75% Min.	70% min.

Crushed Screenings ½" — No. 4 or B.S.T.

	Specification Limits	Tolerance Limits
% Passing ⅝"	100	95-100
% Passing ½"	95-100	90-100
% Passing No. 4	0-15	0-20
% Passing No. 10	0-3	0-7
% Passing No. 200	0-1.5	0-2.0
Fracture	75% Min.	70% Min

Crushed Screening 3/8" — No. 10

	Specification Limits	Tolerance Limits
% Passing 1/2"	100	95-100
% Passing 3/8"	90-100	85-100
% Passing No. 4	30-56	25-61
% Passing No. 10	0-10	0-12
% Passing No. 200	0-1.5	0-2.0
Fracture	75% Min.	70% Min.

Crushed Screenings No. 4 — 0" for B.S.T.

	Specification Limits	Tolerance Limits
% Passing 3/8"	100	95-100
% Passing No. 4	76-100	71-100
% Passing No. 10	30-60	26-64
% Passing No. 200	0-10.0	0-11.0
Fracture	75% Min.	70% Min.

Ballast

	Specification Limits	Tolerance Limits
% Passing 2 1/2"	100	100
% Passing 2"	65-100	60-100
% Passing 1"	50-85	45-90
% Passing No. 4	26-44	21-49
% Passing No. 40	16 Max.	20 Max.
% Passing No. 200	9.0 Max.	10.0 Max.
Sand Equivalent	35 Min.	30 Min.
Dust Ratio		3/8 Max.

Shoulder Ballast

	Specification Limits	Tolerance Limits
% Passing 2 1/2"	100	100
% Passing 2"	65-100	60-100
% Passing 3/4"	40-80	35-85
% Passing No. 4	0-5	0-6
% Passing No. 100	0-2.0	0-2.9
Fracture	75% Min.	70% Min.

Crushed Surfacing Base Course

	Specification Limits	Tolerance Limits
% Passing 1 1/4"	100	95-100
% Passing 1"	80-100	75-100
% Passing 3/8"	50-80	45-85
% Passing No. 4	25-45	20-50
% Passing No. 40	3-18	3-20
% Passing No. 200	7.5 Max.	9.0 Max.
Sand Equivalent	40 Min.	35 Min.
Fracture	75% Min.	70% Min.

Crushed Surfacing Top Course

	Specification Limits	Tolerance Limits
% Passing ¾"	100	95-100
% Passing ½"	80-100	75-100
% Passing No. 4	46-66	41-71
% Passing No. 40	8-24	5-27
% Passing No. 200	10.0 Max.	11.0 Max.
Sand Equivalent	40 Min.	35 Min.
Fracture	75% Min.	70% Min.

Maintenance Rock

	Specification Limits	Tolerance Limits
% Passing ¾"	100	95-100
% Passing ½"	90-100	85-100
% Passing No. 4	45-66	40-71
% Passing No. 40	10-25	8-30
% Passing No. 200	7.0 Max.	8.0 Max.
Sand Equivalent	40 Min.	35 Min.
Fracture	75% Min.	70% Min.

Gravel Base

	Specification Limits	Tolerance Limits
% Passing 2"	75-100	70-100
% Passing No. 4	22-100	17-100
% Passing No. 200	10.0 Max.	11.0 Max.
Sand Equivalent	30 Min.	35 Min.
Dust Ratio	⅓ Max.	

Gravel Backfill for Walls

	Specification Limits	Tolerance Limits
% Passing 4"	100	100
% Passing 2"	75-100	70-100
% Passing No. 4	22-66	17-71
% Passing No. 200	5.0 Max.	6.0 Max.
Sand Equivalent	60 Min.	55 Min.
Dust Ratio	⅓ Max.	

10-1	General	10-1
10-1.1	Introduction	10-1
10-1.2	Requirements for Notes	10-1
10-1.3	Source Documents	10-1
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10-2	Measurement of Items of Work	10-2
10-2.1	General	10-2
10-2.1A	Introduction	10-2
10-2.1B	Quantity Details	10-2
10-2.1C	Item Quantity Ticket	10-2
10-2.1D	Conversion Factors	10-3
10-2.2	Items Measured by Weight	10-3
10-2.2A	General Instructions	10-3
10-2.2B	Weighing of Small Quantities	10-4
10-2.2C	Weighing Equipment	10-4
10-2.3	Items Measured by Volume	10-4
10-2.3A	Truck Measure	10-4
10-2.3B	Cross-Sections	10-5
10-2.3C	Neat Line Measurement	10-5
10-2.4	Items Measured by Hour/Day	10-5
10-2.5	Items Measured by Lump Sum	10-5
10-2.6	Items Measured by Other Units	10-5
10-2.6A	Linear Measurement	10-5
10-2.6B	Area Measurement	10-6
10-2.6C	Per Each Measurement	10-6
10-2.7	Items Bid at “No Charge”	10-6
<hr/>		
10-3	Final Records for Projects Constructed by Contract	10-6
10-3.1	Records	10-6
10-3.1A	Permanent Records	10-6
10-3.1B	Temporary Final Records	10-6
10-3.2	Contracts	10-7
10-3.3	Change Orders	10-7
10-3.4	Contract Estimate Payments	10-7
10-3.5	Final Record Book No. 1	10-7
10-3.6	Diary Records	10-8
10-3.6A	Project Engineer’s Diary	10-8
10-3.6B	Inspector’s Daily Report	10-8
10-3.7	Record of Collisions and Traffic Control	10-9
10-3.7A	Record of Collisions and Traffic Surveillance	10-9
10-3.7B	Contractor’s Daily Report of Traffic Control	10-9
10-3.8	Pile Driving Records	10-9
10-3.9	Post Tensioning Records	10-9
10-3.10	Miscellaneous Records	10-10
10-3.11	As-Built Plans	10-10
10-3.12	Final Record Field Notebooks	10-11
10-3.13	Electronically Produced Documents	10-11
10-3.14	Photographs	10-12
10-3.15	Pre-Estimate Reports	10-12
10-3.16	Estimate Reports	10-12

10-1 General

10-1.1 Introduction

This chapter is intended to provide reference and guidance for the project office's use in the keeping of Construction Contract Records. While there may be differing needs or circumstances that must also be met within each project office, it is intended that this guidance be used to help identify the minimum requirements that are necessary in order to establish an adequate method of record keeping. These minimum requirements also help to establish a basic level of uniformity among all project offices statewide. This can help to facilitate the review of records by others and promotes greater efficiency when engineering personnel are transferred or reassigned between different projects or even different project offices. If a clear method of record keeping can be identified prior to the beginning of work, then original field notes and records can be easily prepared and maintained as the work progresses. This will also help to reduce the effort required to produce the final contract records upon completion of the project.

Successful contract documentation requires that measurements and calculations supporting contract payments are accurate and that records of these actions are complete. Contract records and documentation must be sufficiently detailed and maintained in a manner that will withstand an audit and be clear enough to be read and understood by anyone unfamiliar with the project. The Project Engineer is responsible to ensure that these accurate and complete records are maintained for all construction project work. If questions or assistance is needed, the statewide Documentation Engineer as well as the Regional Documentation Engineer are both available as resources for the Construction Project Office's use.

It is recommended that original field notes be kept in a form that can be filed and retained as basic documentation. Field notes taken on scratch paper and then passed to the office should not be considered as acceptable documentation. Transcription of field notes to final record form should be avoided due to the possibilities of error and the unnecessary cost of duplication.

All personnel are responsible to ensure that notes are made correctly and are complete with all pertinent information. Sample notes have been included with this chapter and are intended as a guide or reference in preparing final record notes.

Facsimile machines and electronic mail are normal business practices in most state and private offices. It is acceptable to take action on these types of correspondence; however, in order to properly document and follow the conditions noted in the contract, exchanging or mailing original copies of the documents should follow up all facsimile and electronic mail. This is especially true for any item that requires a commitment by either the Contractor or the Washington State Department of Transportation (WSDOT). Follow up mail copies are required for all issues that require a signature.

10-1.2 Requirements for Notes

Documentation of contract items that are not specifically covered by the sample field notes can, in most instances, be created using the examples as a guide for similar items. The following notations should be carefully observed for correct procedure:

1. Each set of notes should contain the date when they were made and the initials of the persons making them.
2. Each set of notes, except staking notes, should contain the date when the phases of work are accomplished, the initials of the persons who compute and check the quantities noted, the dates when the quantities were computed, the dates when the computations were subsequently checked, the locations where the work was performed, and the corresponding group number.
3. When field notes are used as the basic source document in supporting a payment to the Contractor, they must include the date and initials of the person making the entry into the project ledger, the person verifying the entry, and the six-digit entry number.
4. Each pay quantity identified in the field notes should be designated with the corresponding item number and correct item name listed in the contract.
5. It is recommended that the correct field book or loose leaf sheet always be used for the particular kind of work being staked or measured.
6. The degree of accuracy required for computing unit quantities should be consistent with standards established in Chapter 10-2.1B.
7. It is recommended that sets of field notes and field books be numbered and titled in order to prevent their loss and to aid in tracking payments and their supporting information.

10-1.3 Source Documents

Field notes are one of the many items that might be considered as a Source Document. It is recommended that all field notes, base line notes, centerline notes, and grade books be recorded in bound books. If looseleaf books are to be used, care must be exercised to prevent lost pages.

Notes should be recorded in a manner that is neat, clear, uncrowded, and in sufficient detail so as to be easily understood.

Original entries later determined to be in error must not be obliterated by erasing, application of correction fluid, or taped over. Instead a line should be cleanly drawn through the mistaken entry and corrections entered directly above with the initials of the person making the change. This is very important, as erasures will destroy the legal standing of notes. When revisions require abandonment of a considerable portion of notes, they shall be crossed out and a cross reference made of the book and page number where the revised notes may be found.

Each Final Records book should be labeled and contain a title page using Forms 422-009 EF and 422-009B EF. Each book is to be numbered and a table of contents included on the first page following each book's title sheet. It is essential that original field notes and documents be carefully organized, kept, recorded, and maintained in safe filing facilities during the active stage of a project. These documents should be transferred to safe, adequate, and recoverable storage after the contract is completed. At all times, when not in use, all source documents, reports, survey notes, etc., should be kept in fire resistant files where possible. Additional information on source documents can also be found in Section 10-4.2 of this chapter.

10-2 Measurement of Items of Work

10-2.1 General

10-2.1A Introduction

It is essential that the Project Engineer ensure proper controls are exercised when measuring items of work. The Project Engineer should also ensure that payments are not made for any item that cannot be substantiated by the project records regardless of the work's stage of completion. Items that are paid on the basis of weight or truck volume require measurement of the quantities involved, evidence for receipt of the materials, and documentation for both of these operations through the use of item quantity tickets or other delivery records.

10-2.1B Quantity Details

The number of significant decimal places to which quantities should be measured and/or computed varies with the value or unit bid price of the respective items involved. Unless advised otherwise, the Project Engineer should use the following guidelines.

Bid Price	Significant Decimal Per Unit
Less than \$10 per unit	1.
From \$10 to \$100 per unit	0.1
Over \$100 per unit	0.01

Quite often, good practice would dictate that the various parts of a particular quantity be calculated to a higher significant decimal place or in some other unit, a unit other than that used for payment, and then be converted to the payment unit in the summation. Good judgment should be used in selecting when to actually apply rounding to the quantity. In general, it is considered proper to apply rounding at the first summation of each isolated part. For example, at the summation of a day's item quantity tickets the quantity to be recorded should be rounded to the proper

significant decimal place and the rounded quantity recorded into the project ledger.

10-2.1C Item Quantity Ticket

A three part Item Quantity Ticket (IQT), Form 422-021, has been developed for use as a tool in documenting the many items that are paid for on the basis of quantities of materials or other bid item services that are received at the project site. An example of an IQT can be found in Figure 10-1. When using either the State provided IQT or Contractor provided IQT, the Project Engineer should ensure that the items noted below, identified as minimum required information for documenting receipt of materials and for supporting payment of those materials, are completely filled out on each IQT utilized. Additional information may be added to the item quantity tickets at the option of the Project Office. However, this additional information would be intended only as a convenience for project staff in their work monitoring material use. The Project Engineer should also ensure that the carrier transporting each load of material or the person responsible for the particular contract bid item or service is issued an item quantity ticket for each delivery of the material or service to the jobsite.

In lieu of using Form 422-021, tickets may also be furnished by the Contractor, commercial scale companies, or suppliers at commercial plants or material sources. These tickets are sometimes electronically produced. In some instances these tickets can be programmed in advance of the hauling to accurately print, on each ticket, the minimum required information as noted below. While this can be done by the contractor in an effort to cooperate with the Project Office towards successful completion of the project, the Project Engineer must ultimately ensure that the minimum required information is accurately noted on each ticket.

The following minimum required information is to be recorded on each State-provided IQT, Contractor provided IQT, or IQT's produced by fully automated scales:

- Contract Number
- Date
- Contract Unit Bid Item No.
- Initials of person accepting the item on the jobsite
- Unit of measure
- Identification of hauling vehicle, as appropriate
- Record of the gross, tare, and net weights. If the scale has a tare beam so that the net weight can be read directly or when using batch plants or storage silos with direct reading scales, only the net weight need be recorded. If the unit of measurement is cubic meters, cubic yards, hours, etc. only the net amount need be recorded.

In addition to this minimum required information, there are a number of other items that could also be included on the item quantity tickets. While this information is helpful to others who may also be using these same tickets for monitoring materials, materials placement, or other issues, this additional information is not required for documentation supporting payment for materials received. Placing this information

on item quantity tickets can be helpful, but is solely at the option of the Project Office. Some of these optional items may include:

- The Group, Station, Mile, or Kilometer of material placement or use can be noted to help identify material's location on the jobsite. It can also be used to help identify group payment.
- Contractor/Subcontractor completing the work represented by the ticket noted.
- Cumulative totals for the day.
- Pit number identifying the source of the material.
- Time weighed and initials of the person issuing the ticket.
- Time materials or services are received on the jobsite.
- Description of the material that matches the unit bid item name.
- Ticket serial number, etc.

A representative of WSDOT should be assigned as a receiver at the delivery site or at the site where the item is to be placed. The receiver should collect the tickets from the carrier upon delivery of the ticketed material, record any required or additional information on the ticket as necessary, and retain the original copy for payment. When using Contractor or State provided multiple part tickets, the Contractor's representative should be provided the copy marked "Contractor" either upon delivery or at the end of each day's operation.

For materials or services that are not paid for by weight, the receiver should complete the ticket at the point of delivery. The appropriate items required to identify the material or bid item service, the quantity, and its placement should then be filled in.

Payment and documentation of materials received should be based on the original tickets received at the project site. Any tickets that may be identified as missing should be reconciled immediately with the Contractor so they will not be in contention for payment at a later date. Unless the Project Engineer decides otherwise, when using the State provided item quantity tickets it is not necessary to retain the goldenrod or "Book" copy. Once the Contractor has been provided with the green copy of the ticket marked "Contractor" and the white copy of the ticket marked "Original" has been reconciled and approved for payment, the goldenrod or "Book" copy may be discarded.

10-2.1D Conversion Factors

Where the plans require a weight measurement for minor items of construction, the contractor may request permission to convert volume to weight. When approved by the engineer, an agreed factor may be used to make this conversion and volume may be used to calculate the corresponding weight for payment. The provisions for this conversion factor can be found in Section 1-09.2(5) of the *Standard Specifications*. When using a conversion factor the Project Engineer must perform adequate tests and retain supporting data establishing the conversion factor or new price quotation. A letter of agreement or change order for the conversion factor is needed.

10-2.2 Items Measured by Weight

10-2.2A General Instructions

All materials paid on the basis of weight are to be weighed in accordance with the provisions of the *Standard Specifications* by a representative of WSDOT or at commercial scales operated by a commercial scale operator. When commercial scales are used a representative of WSDOT will periodically observe the weighing operation and scale check procedures. These periodic reviews are to be unscheduled and not less than twice a week. Both WSDOT and commercial scale operators will record the necessary weights and information on Item Quantity Tickets in accordance with Chapter 10-2.1C of this manual.

In accordance with Section 1-09.2(1) of the *Standard Specifications*, WSDOT and commercial scale operators will test the scales at least once daily. Several times each day the operator will also make certain the scale balances and returns to zero when the load is removed. The results of scale testing conducted by both WSDOT and commercial scale operators including determination of scale variance, AM/PM tare weights where needed, and intermittent scale balancing are to be recorded for each day's production on the Scaleman's Daily Report Form 422-027 EF. These reports representing each day's production are to be submitted to the engineer daily.

When platform scales are used the scale platform shall be of sufficient length to weigh the entire hauling vehicle or combination of connected vehicles at one time. When needed for gross weight determinations, tare weights for each truck are to be taken at least twice daily and recorded on a tare sheet, scaleperson's diary, or shown on the Scaleman's Daily Report. When using a tare beam scale, the tare weight for each individual truck is to be set on the beam at the time of weighing.

For most materials, material and tare weights will be measured to the nearest 100 pounds (50 kilograms). In determining quantities for materials produced from batch type mixing plants, where individual components of each batch of materials are weighed before mixing, the batch weights are acceptable for measurement and payment.

When placing surfacing materials, gravel backfill, riprap, and other similar materials the preferred method for acceptance of quantity is by Item Quantity Tickets. However, where it is reasonably certain that no diversion or substitution of materials can occur, or where an alternative method of calculating the approximate quantity received can be devised, the requirement for issuing and receiving a weight ticket for each individual truckload can be waived. The Project Engineer must approve the use of this procedure in advance of the hauling operation and document to the file the reasons for doing so. In making this decision the Project Engineer should review the risks and the benefit/costs for altering the standard method for receipt of materials. Among other things, this review could include labor savings, the proximity of the scale location to the point at which the materials are to be received, the potential or risk for diversion or substitution of materials, efforts made to mitigate those risks, as well as the methods used to verify the quantities of materials that

are received. If an alternate method for receipt of materials is approved it must include provisions for keeping a scale sheet where the weights for each load are recorded along with the other information normally required for an Item Quantity Ticket. The method must also include a procedure for validating the quantities indicated by the dispatch record as being received. This might be a tally sheet, maintained at the project site, showing the arrival of each load. Another method might be a calculation of neat-line volume, which could be compared with weighed quantity to disclose a reasonable conversion factor. In any method, an occasional random check of a loaded vehicle will be needed to provide validation of both the weigher and the scale.

10-2.2B Weighing of Small Quantities

It is recognized that there are certain instances involving small quantities of weighed materials where commercial scales are not reasonably available or where the Project Engineer is unable to staff a WSDOT scale operator to weigh materials at a contractor provided scale. In these instances where materials are received intermittently throughout the day and the quantities amount to less than 200 tons (tonnes) of untreated materials or 100 tons (tonnes) of treated materials per day, the Project Engineer may choose to receive the material on the basis of weights supplied by the Contractor or supplier. The Project Engineer should ensure that an Item Quantity Ticket is filled out completely and signed by the person who is the weigher of the material. A Scaleman's Daily report is not required for the weighing of these small quantities of materials. Under these conditions, the acceptance of the material will depend entirely on the judgment of the receiver. The receiver of the material should observe the load to ensure the quantity of material shown on the weight ticket appears to be reasonable. The receiver should note this observation in the remarks section on the weight ticket supplied by the Contractor.

The Project Engineer should use their professional judgment in limiting the use of contractor provided weights. This provision is provided to the engineer so that effective scheduling of WSDOT forces can be made in order to meet other project inspection demands. Every effort should be made to use either a WSDOT or a commercial scale operator while limiting the use of this provision to only those instances that require this action.

10-2.2C Weighing Equipment

Scales for the weighing of natural, manufactured, or processed highway and bridge construction materials that are required to be proportioned or measured and paid for by weight, are to be furnished, erected, and maintained by the Contractor, or be permanently installed, certified, commercial scales. All weighing equipment and scale operations must meet the specific requirements noted in Section 1-09.2 of the *Standard Specifications*.

10-2.3 Items Measured by Volume

10-2.3A Truck Measure

Except as noted below, when materials are measured and paid on the basis of volume delivered in trucks, the Project Engineer should ensure that a receiver is assigned at the point of delivery to issue or receive load tickets and to make periodic computations of yield where applicable.

Item Quantity Tickets (see Chapter 10-2.1C) should be used for recording the volume of materials paid on the basis of truck measure. The tickets should include all information previously noted as required for materials measured by weight, with the substitution of measured volume in place of measured weight to be shown as the quantity received.

Surfacing Material, Gravel, Topsoil, etc.

In lieu of issuing individual load tickets when surfacing materials, gravel backfill, top soil, etc., are measured and paid for on the basis of volume delivered in trucks, it is acceptable for the Project Engineer to maintain a field book record showing a recording for each delivery, issuing one ticket for the total amount delivered for each item at the end of each work shift. The field book record will show the truck number, time of delivery, and volume for each load. The ticket issued shall show all pertinent data including reference to the field book number.

In documenting the size of loads received, ensure the following procedures are followed:

1. The volume of the truck box of each hauling conveyance will be calculated and recorded for final records to the nearest 0.1 cubic yard (cubic meter) based on a struck or water level height for the leveled load. The volume may be calculated by using a measurement of the truck box (either from the interior or exterior of the bed) using any standard measurement method. This measurement may be performed by a representative of the Engineer or by the Contractor, as verified by the Engineer. The calculation may also be made based upon verified Manufacturer's truck bed dimensions supplied to the Contractor by the Manufacturer, or by filling the truck bed and measuring the volume of a full load after it is dumped. Although state law requires 6 inches (152 millimeters) of freeboard on loaded aggregate material trucks, the actual quantity hauled or calculated may exceed the measured capacity. This is due to the normal practice of heaping material in the center of the load.
2. The material receiver should have sufficient loads leveled at the point of delivery in order to judge consistency in the quantity being hauled.
3. Load volume will be recorded to the nearest cubic yard (0.5 cubic meter) for pay purposes using the volume computed in part (1) above. If the Inspector questions whether a truck is fully loaded, the load will be leveled. If the vehicle is not fully loaded, the Inspector will measure and document the actual load to the nearest cubic yard (0.5 cubic meter).

Water

In order to document the amount of water delivered to the project, a Water Delivery Record, Form 422-024, should be maintained showing all pertinent information including time, volume, location of delivery for each load, contract number, and truck number. If the driver maintains the Water Delivery Record, it should be signed by the truck driver or the Contractor and initialed by the Inspector. Daily spot checks should also be completed verifying the quantities being delivered. When performed, random spot checks should be noted on the Delivery Record itself. At the end of each work shift an Item Quantity Ticket should be issued to cover the water delivered to the project that day. The Water Delivery Record should be maintained in a manner that allows it to be easily referenced to the corresponding WSDOT copy of the Item Quantity Ticket used for payment.

The Project Engineer should ensure that the capacity of each water truck is determined by measuring or weighing, and is recorded in the project records. It is recommended that copies of the truck identification and capacity records be attached to the water ticket book to ensure the information is available to the field Inspector.

When water meters are installed at the discharge point for hydrants or water trucks, the Inspector should record the meter reading at the beginning and end of each shift and issue a ticket for the net quantity of water placed in accordance with contract specifications for the item. The Project Engineer should also ensure that the meters are checked for accuracy and that the checks are recorded in support of payment documentation.

10-2.3B Cross-Sections

Many excavation items are measured by field cross sections and/or template notes. The Project Engineer should ensure that the project is staked and measured accurately in accordance with guidance noted in the "Basic Surveying" manual and utilizing sound engineering practices. As a minimum, the field notes should show the date the data was taken, weather, Crewmembers, and their assigned duties. When re measurements are required, it is important that the same base line and elevation datum be used.

Documentation of volume measurement for excavation areas which require original and final measurements, should contain cross references between the original notes and the re-measure notes. Also references should be made to the transit notes and elevation datum for that excavation area.

10-2.3C Neat Line Measurement

Some items, such as concrete volumes, are paid based on dimensions detailed in the plans. For these items, the quantities need to be calculated and the calculations made a part of the record. If additional sketches or dimensions are also required in order to compute the quantities, these should be included in the records as well.

Other items, such as structure excavation and gravel backfill, are measured for payment using neat line volumes based on plan dimensions as a maximum limit. These items require field measurement to determine pay quantities that may be less than neat line maximums. Many times, sketches with the dimensions shown are desirable. The dimensions should show the limits of the actual work, except when these limits exceed the maximum allowed for payment, then the dimensions should be limited to the maximum allowed.

10-2.4 Items Measured by Hour/Day

When contract items are to be measured and paid for on an hourly or daily basis, the Project Engineer is to ensure that a WSDOT representative is assigned to verify the hours or days of payment, and issue Item Quantity Tickets or other verified field note records. At least one ticket should be issued at the end of each work shift or working period. The Project Engineer should ensure that tickets show all pertinent information for the item involved. Some items measured by the hour may be eligible for payment during non-shift hours; for example, a 24-hour flashing arrow used for lane closures or detours in effect during nonworking hours. In these situations, an Item Quantity Ticket for one shift may show more hours for payment than are actually available within the shift.

In order to ensure agreement on the hours or days of work performed, Item Quantity Tickets for items of work measured by the hour or by the day should be initialed by the Inspector and signed by the Contractor's representative on a day-to-day basis.

10-2.5 Items Measured by Lump Sum

For items that are to be paid on a Lump Sum basis, the project records should identify the item, the date that the material was received, and/or the date work was accomplished. This can be accomplished by ensuring that a field note record is made showing the dates work was performed, has the initial of the Inspector, and shows the work to be 100 percent complete. A field note should also be used to show any estimated portions for progress payment of a Lump Sum amount prior to 100 percent completion. It must include the basis on which any quantities used for progress estimate payments were calculated.

10-2.6 Items Measured by Other Units

10-2.6A Linear Measurement

Records for materials measured by length should show the length measured, initials of the persons making the measurements, and the date measured.

For features, such as guard rail and barrier, that are paid by length and which contain repetitive elements or units, the length may be "measured" by calculation. In other words, if the length of a single element is known, then the number of elements may be counted and multiplied by that amount and a total "measured" length determined. Care should be taken to account for odd length elements, such as end sections and custom-fabricated pieces, and for areas where elements overlap or gaps exist.

Records for measurement should also include the beginning and ending stations of the work, recorded by the Inspector or person making the measurement, tying the work to its location on the project. The dates of construction should also be recorded.

10-2.6B Area Measurement

Records for materials or work measured by area should show the length and width measured or otherwise determined, initials of the persons making the measurements, and the date measured. In many instances a sketch of the area with the measurements would be very helpful in showing the computed area. The dates of construction should also be recorded.

10-2.6C Per Each Measurement

Records for materials or work measured per each unit should provide a listing showing the location of each item constructed, dates constructed, and initials of the Inspector or person measuring the item.

10-2.7 Items Bid at “No Charge”

Normal documentation procedures are not required for items bid at “no charge” if the items do not physically constitute a portion of the finished work. However, notes in the diary or Inspector’s Daily Report are necessary to show when the work was done. Examples of these items might include water, haul, and embankment compaction.

For items bid at “no charge” which physically constitute a portion of the finished work, normal documentation procedures, such as Item Quantity Tickets or cross sections, are required to show how the item was incorporated into the project. Examples of these items might include layering materials and prime coat aggregate.

10-3 Final Records for Projects Constructed by Contract

10-3.1 Records

These records consist of field books, Inspector’s record of field tests, project and Inspector’s diaries, Inspector’s Daily Reports, invoices, weigh bills, Item Quantity Tickets, receiving reports, project ledgers, mass diagrams, plotted cross-sections, computer listings, working profiles, and any other documents that could be considered a basis of payment for work performed or materials furnished. All records that are created during the administration of a construction project can be placed in one of two categories, *Permanent Records*, records kept by the Headquarters and State Archives for future reference, and *Temporary Records*, records kept by the Region for a limited period of time after which they are discarded by the Region.

10-3.1A Permanent Records

The Region should ensure that those records designated as *Permanent Records*, records that are to be permanently filed, are assembled as a portion of the overall project final records and are submitted to Headquarters, Engineering Records for filing. All final records sent to Headquarters for filing will be kept permanently as the Permanent Final Records for the completed project.

All final record books prepared for *Permanent Final Records* are to be numbered as outlined below.

Permanent Records consist of the following:

Records provided by Headquarters:

- Contracts
- Change Orders
- Contract Estimate Payments

Records provided by the Project Office in books numbered as follows:

- Final Record Book Number 1
- Project Engineer’s Diary – Book Number 2
- Inspector’s Daily Reports – Book Number 3
- Traffic Control Reports – Book Number 4
Contractors Daily Report of Traffic Control and Traffic Surveillance
- Pile Driving Records – Book Number 5
- Post Tensioning Records – Book Number 6
- Miscellaneous Records – Book No. 7
- As Built Plans and Completed Contractor Provided Shop Drawings

10-3.1B Temporary Final Records

All records designated as *Temporary Final Records* are to be retained within the Region for a period of three years after which they may be destroyed. If a claim, lawsuit, or other circumstance is found to be pending at the end of this three year period, the Region should further retain those pertinent records until the issues have been resolved. The Region should ensure that those records designated as *Temporary Final Records* are also assembled as a portion of the overall project final records. The date for the beginning of this three year retention period for State-funded projects is the Acceptance Date; the date the State Construction Engineer signs the Final Contract Voucher Certification accepting the project. If Federal funds are involved in the project, the date for the beginning of this three-year retention period is the date that FHWA accepts the final payment voucher. The Headquarters Records Services will send a copy of Retention of Records on Federal Aid Projects (DOT Form 133-072) to the Region that specifically indicates the starting and ending dates for this period.

The following list contains some of the items that may be kept as *Temporary Final Records*. This listing is not a complete listing of all the possible items that could be grouped into this category. In short, *Temporary Final Records* consist of all project records that are not kept as *Permanent Final Records*. If *Temporary Final Records* are kept in numbered books then, in order to eliminate confusion with *Permanent Final Records*, these books are to be numbered consecutively beginning with Book Number 8. Examples of *Temporary Final Records* include:

- Item Quantity Tickets
- Project Engineer’s Copy of Estimates
- Project Correspondence

- Inspector's Record of Field Tests
 - Scaleman's Diary and Scale Checks
 - Scale Test Reports
 - Concrete Pour Records
 - Record of Field Audits
 - Approval of Source of Materials
 - Quantity Computation Sheets
 - Surfacing Depth Check Records
 - Prints of Shop Drawings
 - Contractor's Payrolls (Federal Aid Projects)
 - Source document files
 - Alignment (Transit) Book
 - Grade Book
 - Cross-Section Notes
 - Drainage Notes
 - Photographs
 - Mass Diagrams
 - Computer Summary Sheets
 - Computer Listings
 - Falsework and Form Plans
 - Daily Report of Force Account Worked
 - Quarterly Report of Amounts Credited DBE
- Participation
- Annual Report of Amounts Paid as MBE/WBE Participation
 - Washington State Patrol Field Check list

10-3.2 Contracts

The original signed contract documents are maintained in the Contract Processing Section of the State Accounting Services Office during the active stage of a contract. After final payment has been made, Accounting sends these documents to Records Services for permanent filing.

10-3.3 Change Orders

Approved change orders are a legal part of the contract documents and are treated just like the original contract documents. For a complete discussion of change orders, see Chapter 1-2.4C.

10-3.4 Contract Estimate Payments

Documentation of contract estimate payments is facilitated by use of the electronic Contract Administration and Payment System (CAPS) which includes both the monthly progress estimates and the final estimate. For a complete discussion of the contract estimate process, see Chapter 1-3.1. Specific information on the final estimate package is found in Chapter 1-3.1D. After final payment has been made, Accounting sends these documents to Records Services for permanent filing.

10-3.5 Final Record Book No. 1

Final Record Book No. 1 is the first book of the *Permanent Final Records* for a construction contract. It contains indices to the records that have been compiled for both *Permanent and Temporary Final Records*. It also identifies the people who worked on the project and provides specific summary information. Final Record Book No. 1 is to be signed by the Regional Administrator or designee. Final Record Book No. 1 should contain a title sheet, Form 422 009 EF, and should be assembled with a semi rigid, water resistant cover.

The following records are to be incorporated into Final Record Book No. 1 in the order as arranged below. No other material is to be included in this book.

1. *Index*. There are two indices referred to within Final Record Book No. 1. The first is an index or detailed listing showing the various sections of Final Record Book No. 1 itself. An example of an index for Final Record Book No. 1 can be found in Figure 10-2. The second index is actually the first section of the book. It provides a detailed listing of all records that have been kept and assembled for the project, including both *Permanent Records* and *Temporary Records*. An example of this listing or index for Section 1 can be found in Figure 10-3.

2. *WSDOT Personnel List*. Section 2 of Final Record Book No. 1 contains a listing of all WSDOT personnel assigned to the project and their classifications. Each person noted should place their identifying initials after their name on the listing in the same manner as it appears in other final record documents.

3. *Comparison of Quantities*. Section 3 of Final Record Book No. 1 contains this CAPS report prepared from the Final Estimate.

4. *Final Estimate Sheets*. Section 4 of Final Record Book No. 1 contains a copy of the Final Contract Voucher Certification.

5. *Contract Estimate Payment Totals*. Section 5 of Final Record Book No. 1 contains a copy of this report obtained from the final estimate.

6. *Affidavit of Wages Paid*. Section 6 of Final Records Book No. 1 contains all Affidavit of Wages Paid received from the Contractor, subcontractors, lower tier subcontractors or suppliers performing work or providing certain products to the project.

7. *Change Orders*. Section 7 of Final Records Book No. 1 contains a listing of all Change Orders prepared for the completed project.

8. *Record of Construction Materials*. Section 8 of Final Records Book No. 1 contains a tabulation showing the source of all construction materials. If material of a certain type was obtained from two or more sources, the station limits or parts of a structure relative to each source should be shown. Depending on the size of project and the method used to record this activity, a copy of the completed Record of Materials (ROM) or a summary from the contract's ROM database may satisfy this requirement. This is an acceptable method as opposed to preparing a separate or duplicate listing.

When preparing the individual Final Record Books, other than Book No. 1, it is not necessary to label pages within each book. Where it is appropriate, a table of contents may be added to identify sections within a particular book.

10-3.6 Diary Records

Diary records consist of both the Project Diary(s) and the Inspector's Daily Report (IDR). Together they should provide a complete narrative picture of the project, covering both the normal work processes and anything unusual that might have occurred on the project. Diary records are to be included in the project's *Permanent Final Records*.

10-3.6A Project Engineer's Diary

A complete, well-kept Project Diary is a valuable administrative tool. It is a collection point for many of the project's pertinent facts arranged in any chronological order. It may show how questions were answered, how problems were solved, progress of the work, and unusual conditions pertaining to working days charged. It can provide data for analysis of both claims and requests for extensions of contract time. It is also available for reference long after the work is completed.

The Project Engineer should ensure that a Project Diary is kept current for every construction contract. It is recommended that the Project Diary be maintained primarily by the Project Engineer. However this responsibility may be delegated to the Assistant Project Engineer or to the Chief Field Inspector. At a minimum, one Construction Project Diary is required for each project. The Project Diary should be used to record all matters of importance which are not covered by other routine reports or may contain a record of routine matters if the circumstances are unusual, conferences with the Contractor or the Contractor's field representative, agreements made, special notes regarding equipment or organization, labor conditions, weather or other causes for delays if of any consequence, and any other matters that might have a bearing on the completion of the project. To avoid keeping separate diaries and to avoid duplication, the Project Engineer and the principal assistant(s) may make entries in the same diary. Each diary entry should include the date of the entry and be followed by a signature or initials on the line immediately under the entry to identify the writer. The Project Engineer is responsible for ensuring the existence of a Construction Project Diary for each project.

10-3.6B Inspector's Daily Report

The Inspector's Daily Report (IDR) is a record of operations for a specific type of work on the project, such as surfacing, grading, paving, bridge, etc., which is being inspected by the writer. Page one of the IDR is a structured sheet of questions addressing identification of work operations and the associated labor and equipment being used to accomplish the work. This page should be filled out completely for all questions that pertain to the specific type of work activity being inspected. Page two is a narrative portion that should include a notation of any orders given or received,

discussions with the Contractor, unusual conditions, delays in the operations, and the presence of any visitors. If an operation is being inspected which results in the partial payment of an item, the item should be identified along with the basis for calculating the partial payment. It is also of value to note the Inspector or Engineer's activities in the daily report.

The Project Engineer should ensure that the Inspector's Daily Report, Forms 422-004 EF, 422-004A EF, and 422-004B EF, are utilized for completing this daily report of activities. Each page of these forms is printed separately in a tablet in duplicate on NCR paper. Both types of tablets have the instructions printed on the tablet cover. The original copy is to be submitted to the Project Engineer each day.

If necessary, the Project Engineer should add comments or remarks on the original copies of the Inspector's Daily Reports to clarify the report. The duplicate copy of the report should remain in the book for the Inspector's immediate information and may be discarded when it is no longer useful for that purpose. The original copies of the Inspector's Daily Report should be included in the Final Records for permanent retention.

IDR Content

The IDR is intended to document communication, progress of work, contractor workforce/equipment and materials sampling/acceptance. Keeping this in mind, the following are general rules for content of IDR's:

1. Remember that the IDR is part of the public record and may be called upon in case of litigation. The level of detail and professionalism exhibited may be of great benefit.
2. Do not make (or document) derogatory comments, as this is unprofessional behavior, and may be used to demonstrate that the inspector was hostile toward the Contractor and did not behave in a manner consistent with good faith.
3. All statements must be based on facts and requirements should reference the contract requirements.
4. All entries should be clear, neat, correctly spelled, and most importantly, legible.
5. Summarize key points of any discussion of work activities with the Contractor.
6. Be specific when recording information about work activities. Use drainage codes, exact bid item numbers, line and station limits, etc. Avoid referencing a co-worker's IDR, but if doing so, attach a copy.
7. Be specific when recording deliveries of materials to the project. Use bid item numbers, drainage codes, RAM number, etc. Record heat numbers, lot numbers, "Approved For Shipment" and "WSDOT Inspected" tags or stamps, etc. Using the IDR as materials documentation is acceptable. If used as documentation for acceptance, a copy of the IDR, with the appropriate items high-lighted, should be included with the materials documentation file.

8. Daily Equipment Status Reports should be complete and current.
- Record all equipment, including any trailer or transport used to deliver equipment to the project.
 - Record the make, model and year of equipment. Request an equipment list from the Contractor and keep it updated. Photos make a good record of condition and configuration.
 - Record the exact bid item on which the equipment was working.
 - Understand the difference between down, idle and standby time; and use the correct term on the report.
 - Record crew composition (once a week or whenever it changes) along with the hours worked where practicable. This can be done on a separate IDR or in the narrative portion (pg 2).
9. Record a chronology of events throughout the day, as they occur. Taking notes and transferring them to the IDR will work, but duplicates work and introduces and opportunity for error.
10. Record any potential delay, in as much detail as possible. Include start and end time, who was notified of the issue and when; along with any mitigating action by the Inspector or the Contractor.
11. Record every time the Contractor disagrees with a determination or protests a decision by the Engineer, and remind the Contractor to follow the process for protest as defined in the *Standard Specifications*.

Subject to the following, it is acceptable for inspectors to produce IDR's by recording information onto a recording device while at the job site for later transcription to a paper format.

1. All information required on the regular handwritten form must appear on the typed version.
2. The inspector must read and sign the typed document. (It is desirable for this to take place within 24-48 hours of the reporting period. However, it is recognized that certain situations may not permit this time frame and therefore it is not mandatory.)
3. The inspector may make and initial hand corrections to the typed document.

Please note that inspectors who use lap top computers also produce electronic versions of the IDR document. The electronically produced document must be complete, including signature, consistent with the above criteria.

10-3.7 Record of Collisions and Traffic Control

10-3.7A Record of Collisions and Traffic Surveillance

In the past, all Record of Accidents (now known as Record of Collisions) received by the project engineer's office used to be included as part of the Permanent Records. Since collisions recorded by the WSP are now part of WSDOT's Transportation Data Office records (TDO), there is no need for a project office to keep Record of Collisions in either the Temporary or Final Records. If it is necessary to change traffic control as a result of a collision, the project office only needs to reference the record of collision report in either the Project Engineer's diary or Inspector's Daily Report. The Record of Collisions should only be used during the life of the project to augment decisions on changing traffic control plans during construction. It should be noted that Chapter 1-2.3E of this manual does not require a collision report be obtained for every collision that may occur within the project limits.

A separate file should also contain the records of traffic control surveillance prepared in accordance with Chapter 1-2.3E of this manual. Information in this file should be kept current and upon completion of the contract, submitted to Headquarters Engineering Records as a part of the project's *Permanent Final Records*. When the Washington State Patrol provides the Project Engineer with traffic control assistance they also provide the Engineer with form 421-045 EF, WSP Traffic Control Checklist. While this form is a part of the traffic control operations, it can be kept separately and made part of the Temporary Final Records.

10-3.7B Contractor's Daily Report of Traffic Control

The Contractor's Daily Report of Traffic Control (DOT Forms 421-040A EF and 421-040B EF), completed by the Contractor's Traffic Control Supervisor, should also be included as part of the project's *Permanent Final Records*. The Contractor's Daily Report of Traffic Control is discussed in more detail in Chapter 1-2.3 of this manual.

10-3.8 Pile Driving Records

The Pile Driving Record Book, Form 450-004, should be included and made a part of the *Permanent Final Records*. The requirements for pile driving and pile driving records are further detailed in Chapter 6 of this manual.

10-3.9 Post Tensioning Records

The Post Tensioning Record Book, Form 450-005 EF, should be included and made a part of the *Permanent Final Records*. The requirements for post tensioning and post tensioning records are further detailed in Chapter 6 of this manual.

10-3.10 Miscellaneous Records

Miscellaneous Records are, in general, optional records and may be included in the permanent records at the Project Engineer's discretion. This part of the records is intended for items that might be considered of added importance. This might include photographs of special features or construction methods, information regarding opening to traffic, dedication activities, or other documentation of particular importance. Placing these in the *Permanent Final Records* will make them a matter of permanent record where they will be retained for future reference.

Records of environmental contamination issues, such as records of disposal of contaminated materials, are not optional and should be included in Miscellaneous Records.

10-3.11 As-Built Plans

As-Built Plans are a record of changes made to the originally intended physical product of the contract. As-Built drawings should reflect the same degree of detail as the original plan drawings. As-Built Plans are necessary as a way of preserving the historical detail of what occurred on the project. As-Built Plans can also be used as a basis to plan and design future projects in the same location and to make repairs to damaged structural components or other non-functioning facilities. In addition, state law requires that owners of "underground facilities" be able to locate these facilities within 24 inches (600 millimeters) of the outside dimensions. As-Built Plans offer a convenient means for recording these facilities.

Within two weeks after a contract has been awarded, the State Pre-Contract Administration Office or Printing Services Office will furnish the Region Office with one set of large size black line prints of the contract plans which will be marked "For As Constructed Plans Only." These plans shall be used by the Project Engineer solely for the purpose of preparing "As-Built Plans." All corrections, revisions, and additional sketches, necessary to depict the work as it was constructed should be shown on these plans. Corrections are to be made by lining out quantities or features that were changed during construction, then noting the correction or change in red ink. These corrections and revisions are to be noted on the plans in a manner that results in neat and legible sheets. A red pen that writes sharp, clear, and dark with a medium width line shall be used to mark these notations. Fine lined pens do not reproduce well when scanned and are not to be used. If electronic versions of these plans are available, corrections noted electronically and plotted in a manner that produces these same results are acceptable. Special care must be taken to ensure that changes in construction are noted on all contract plan sheets affected by the change. For instance, the change in location of a catch basin or manhole may affect the location listed in the structure note sheet, the drainage plan view sheet, and the drainage profile sheet.

If concrete foundations are partially removed, the remaining portions of the foundations should be shown on the As-Built Plans. It is not required that the As-Built, Summary of Quantities sheets be revised to reflect final estimate quantities. Summary of Quantity sheets are to be marked identifying them as original plan quantities which are shown as preliminary estimates of work. It should also be noted that final As-Built quantities for individual unit bid items can be obtained from the final CAPS ledger for the project.

In order to help identify significant changes in work location or significant changes in the work completed at a particular location, the Quantity Tabulation sheets must be updated to show the actual physical feature items or the locations of installations where significant changes were made. Types of significant changes may include revisions to guardrail, guardrail termini, post types, anchors or anchor types, revisions to monuments, etc. The intent is to show what significant changes to the planned work were made. Except for significant changes to quantities of items used or items added at a particular installation, it is not necessary to update item quantities for actual quantities used. Final As-Built quantities for the individual unit bid items can be more accurately obtained from the final CAPS ledger for the project.

In order to help identify significant changes in work location or the significant changes in the structure work completed at a particular location, the Structure Note sheets must be updated to show the actual physical feature items or the locations of installations where these significant changes were made. Types of significant changes may include structure notes that were added or revised, pipe size and types that were changed, revised locations for catch basins manholes, etc. The intent is to show what significant changes to the planned work were made. Except for significant changes to quantities of items used or items added at a particular installation, it is not necessary to update item quantities for actual quantities used. Final As-Built quantities for the individual unit bid items involved can be more accurately obtained from the final CAPS ledger for the project.

Correction tape may only be used to complete corrections or revisions made to the Quantity Tabulation and Structure Note sheets. Correction tape is not to be used for noting corrections on any other plan sheet of the As-Built plans. If electronic versions of these sheets are available, corrections noted electronically that clearly depict that a change has been made and plotted in a manner that produces these same results, is acceptable.

In addition to the requirements outlined above for As-Constructed or As-Built contract plans, the *Standard Specifications* also require that the Contractor furnish the Engineer with original reproducible tracings or drawings suitable for scanning or for use in correcting contract plans for; shop drawings, schematic circuit drawings etc. for Illumination, Traffic Signal Systems, and Electrical for shop drawings, including approved revisions for prestressed structural elements and all other structural steel components fabricated from shop plans. Specific requirements for these plans are outlined in Sections 6-02.3(26)A, 6-03.3(7), 8-03.3(10) and 8-20.3(17) of the *Standard Specifications*.

Upon project completion, all “As-Built” plans are to be arranged in numerical sequence, including a cover sheet using Form 722-025, and submitted to the Headquarters Engineering Records office, where they will become a part of the project *Permanent Final Records*. As-Built plans are being scanned to the Record Management Information System (RMIS). In order to achieve consistency, each Region shall:

- Submit as-built plan sheets with Form 722-025 EF attached
- Submit full sized plan sheets only
- Make corrections in red
- Attach photographs, when appropriate, in a .Jpg or .TIF format

Unless notified by the Region to do otherwise, Engineering Records will recycle (shred) the submitted as-built plans.

10-3.12 Final Record Field Notebooks

Field notebooks are bound books of notes that are used for specific kinds of work such as alignment notes, grading notes, pile driving notes, etc. Field notebooks can also consist of loose leaf field notes that have been bound together into books as well. Records that appear in the field books should not be duplicated and placed in other final record books. The only exception to this rule are copies of Field Note Records with multiple item numbers which may be copied as described in Chapter 10-4.3, Structure Notes.

Field notebooks should be consecutively numbered and each should have the pages numbered beginning with number one. Typing information in the field book is not necessary as hand lettering is preferred. As with other project records, erasure corrections of any kind are not permitted.

The quantities for payment for each item of work in the field notebook shall correspond directly to entries in the CAPS project ledger. Adequate cross-referencing must be made between the field notebook and the project ledger in order to trace item quantities and entries from one to the other.

The field notes should show the initials of the persons or person making them, the date, and the weather conditions if appropriate. In some cases, different stages of work will be noted on the same page, such as staking, measurement, and construction. This would require dates and initials at each stage of work. The notes shall also show the dates that quantities are computed and checked along with the initials of those persons doing the work. In all cases, field notes should be neat and legible and show all necessary information. Figures 10-4 and 10-5 show sample field notes and summary for clearing.

Sketches should be shown when necessary to compute a quantity that cannot be computed from the As-Built Plans. Sometimes structure excavation sketches are helpful for determining the pay limits and computing the volume; other sketches are helpful on special details.

Current business practices provide for electronic calculation and storage of all types of detailed surveying data, quantity calculations, etc. Data forms for template input, calculation setup, forms for direct recording of field information, storage media for electronic files, as well as output for the calculated data shall all be treated as an original source documents. See Chapter 10-3.13 for further direction in regards to electronic data.

Remeasure cross section notes, where a deviation from the established roadway section or slopes has occurred, should be indexed carefully so that they can be identified readily with the original cross section. For convenience of calculation on remeasure, plotted cross sections may also be used.

Structure and drainage notes in the Final Record Field Notebook should show the stationing, distance left or right, angle or skew if applicable, flow line elevation and grade in the case of culverts, drains and ditches, and all information necessary for computation of the pay items involved in the construction. For convenience, it is recommended that all pay quantities pertaining to the construction of items listed on the Structure Notes sheets of the plans, be shown in the field book with structure note number, item number, and quantities, and that cross-references be used to show where the totals were obtained. It should be remembered that quantities must be segregated by group number as shown in the summary of quantities contained in the contract plans.

For use as an example, Figures 10-6 and 10-7 show the front and back of a completed field note for the installation of a reinforced concrete sewer pipe.

10-3.13 Electronically Produced Documents

There are many computer applications available for use on a WSDOT highway construction project. Included are programs for earthwork quantities, mass diagrams, basic cut and fill, geometrics, surveying, and for determining structural quantities. In addition, there are many other “stand alone” applications created by individuals in each office for use on personal computers that are also recognized for these kinds of uses.

When electronic computations are used, the output generated must be bound together and identified with a title sheet for final record purposes. These documents are to be made a part of the three-year *Temporary Final Records* retained by the Region as explained in Chapter 10-3.1. When a computer program is used to calculate quantities for payment, the summary sheets containing the quantities entered in the project ledger must be treated as source documents with all required signatures, dates, ledger entry number, and sufficient cross referencing to provide a good audit trail.

10-3.14 Photographs

A detailed photographic record is an important part of the project documents. A photographic record could consist of filmed photographs, digital photos, infrared photographs, video, etc. A photographic record should be taken of unusual equipment, construction methods, problem areas, areas of possible controversy, traffic control, and especially conditions in the area of an accident. In addition to these are "before" and "after" views taken from the same vantage point. These are particularly useful in documenting the progress of work. When photographs are to be maintained as a part of the project documents they must be fully identified. Photographs should clearly note when they were taken (date and time), where they were taken, and who took the picture. Although photographs are placed in the category of three-year *Temporary Final Records*, some Regions have extended the Region retention period for photographs or have even included them as a part of the project's *Permanent Final Records* for permanent retention.

10-3.15 Pre-Estimate Reports

A Pre-Estimate report prepares the CAPS system to make an estimate payment. This report provides the opportunity for the project office to preview the estimate and is a means to allow for any corrections or deferments to be made before actual payment. The corrected Pre-Estimate Report used to make a progress payment must be signed by the Project Engineer in order to indicate authorization for payment. The signed Pre-Estimate Report must be retained in the project files, and become a part of the three-year *Temporary Final Records*. For additional information regarding progress payments and the CAPS system, see Chapter 1-3.1B of this manual.

10-3.16 Estimate Reports

When a payment is made to the Contractor for a progress or Final Estimate, the project office receives a copy of all the reports that are sent to the Contractor along with the warrant. The Contract Estimate Payment Advice report and the Contract Estimate Payment Totals report should be compared to the Pre-Estimate report verifying that the amount actually paid is the same as the amount authorized. These estimate reports should be kept with the completed Pre-Estimate reports in the project files, and become a part of the three-year *Temporary Final Records*. For additional information regarding progress payments and the CAPS system, see Chapter 1-3.1B of this manual.

10-4 Project Ledger System

10-4.1 General

The Contract Administration and Payment System (CAPS) provides both an accounting and payment system, while also acting as an information collection system. The CAPS program uses an electronic project ledger that is maintained current throughout the life of the project as the backbone of the system. All items of work on a project for which payment is made must be entered into the electronic project ledger. Items posted in the ledger become the basis for payment and summary record document for dollars paid to the Contractor, quantity of work performed by the Contractor, status reports during the active life of the contract, and are also used as the basis for final reports when the project is completed.

As work is completed on the project, the project office continuously enters those quantities into the ledger, those records then become eligible for payment when the next progress estimate is due. Processing of monthly progress and project final estimates is further detailed in Chapter 1-3 of this manual. With the ledger entries completed, the application compiles all those records eligible for payment and transfers the data to the payment portion of the CAPS system. Because of the system's ability to store information it is also used as an extensive resource for corporate information regarding the construction program and is used extensively by many other groups throughout WSDOT.

All electronic data incorporated into the CAPS system is stored on either an active file or a history file. These files are both permanently retained and are available for use whenever the need arises. It is not necessary, or intended, that paper copies of the project ledger be retained for final records.

Detailed instructions for the use of the CAPS system can be found in the CAPS Manual.

A key function of CAPS is to provide a complete accounting trail for every pay item. An accounting trail must be clearly maintained from the original source document through the actual payment to the Contractor. Audits are an effective tool used by both state and federal governments to ensure established procedures and processes are correctly used to maintain the most effective use of the public's funds. It is important that WSDOT maintain sufficient records and documentation to clearly identify an accounting trail that is capable of withstanding the test of audits.

In order to satisfy the requirements of an accounting audit, the following conditions must be met:

- There must be a source document for every ledger entry and vice-versa.
- There must be an orderly filing system to facilitate timely retrieval of source documents.
- Both Interim Progress Estimate and Final Estimate reports must be signed by the Project Engineer.
- The Contract Estimate Payment Advice report must be filed along with its corresponding Progress Estimate report.

10-4.2 Source Documents

Each ledger entry must be supported by a detailed source document, which specifically identifies the type, amount, and location of the work or material that is being entered into CAPS for payment. Source documents used to support these entries are intended to be complete documents, documents that stand alone, and fully support the payment that is being made. If information from other documents is used in the source document, these additional document(s) must be clearly identified in order to complete the audit trail.

Some examples of source documents include Item Quantity Tickets, Field Note Records, Inspector's Estimates, and Force Account sheets. Source documents are the beginning of the audit trail. They show that a WSDOT Inspector has observed and determined the amount of work performed by the Contractor. Also, the source document must show that all calculations have been checked by a second WSDOT employee to ensure they are correct.

Source documents must show four sets of dated initials as follows: (1) the person who does the original calculations; (2) the person who checks the original calculations; (3) the person who enters the payment quantity/amount in the CAPS ledger; and (4) the person who verifies the CAPS ledger entry. In addition, the source document must also show the ledger entry number.

Ledger entries for estimates of monthly progress quantities for grading, lump sum, or other such items must also be supported by a source document. Among other things, the source document must show the method used for determining the estimate. These methods and source documents must lead to an accurate measurement after the item of work has been completed. For lump sum items, the field notes or diaries can show an estimated percentage of work completed. If this percentage method is used, then a brief discussion outlining the basis for the calculation and any assumptions that were used should also be included.

Many project offices use electronic data collectors for surveying work. These data collectors eliminate the need for hand prepared field transit and field level books. Many project offices have also developed or routinely use other electronic programs or applications, which perform calculations and produce a report of the results. In using these applications there can be confusion regarding the need for checking data that has been compiled and reported electronically. In the absence of specific direction, when an electronically produced record or set of notes is used as a source document for a contract payment, the individual who originated the document should be noted. A second person can then check both input and output for both reasonableness and accuracy. This check may range from duplicating the process to verifying the input. Whatever the case may be, it is recommended that the dated initials of those two individuals be on the source document.

10-4.3 Source Document Filing Systems

Basic criteria for a good Source Document Filing System would include ease of set up, ease of use, and the capability to retrieve any specific document in a timely manner. The source document filing system should also be set up to coordinate easily with final records requirements. The filing system described here for source documents is not mandatory. However, it is presented as one alternative that works well with the CAPS electronic ledger system, the final records process, and is easy to use. The unique ledger entry number from CAPS makes this method work. Files are set up in two books or sets of notes. The first book is organized by Unit Bid Item Number and the second book is organized by Structure Note Number. Source documents are filed by Unit Bid Item Number except for drainage items, which are filed by Structure Note Number. With this method there is only one item per source document except for the drainage items. Drainage items are filed by Structure Note Number because their source document (field note record) normally has multiple items while the Structure Note Number is unique to a specific drainage facility. For all other items, if more than one item appears on a source document, a copy is made for each item noted, the desired item number is highlighted, and then the copy is filed behind their respective Unit Bid Item Number locations. This works extremely well if the source documents are placed in order by date in their respective files.

To look at the source document for a ledger entry, simply note the item number, entry number, and date; go to the file and look for the entry number within the item file. If files are maintained in order by date, this is made even easier. For ledger entries of drainage items, it is necessary to include the structure note number in the remarks section.

This system allows anyone to easily locate the source documents that support a contract payment. These records are retained in the Project Office until Final Record time when the source documents are bound into books with their respective titles and made a part of the three-year *Temporary Final Records*.

10-5 Region Project Documentation Reviews

10-5.1 General

The Region is responsible to ensure that reviews of record keeping and documentation procedures are completed during the progress of the work. This will help to ensure that the original field records and pay notes are being properly prepared and that proper procedures are being followed. The Region should review specific pay items for correctness of the payments made as well as for procedural requirements for documenting and processing of contract payments, acceptance of materials and other pertinent contract administration requirements. Reviews of specific pay items should be recorded on Form 421-014 EF. Reviews of procedural items should be recorded on either Form 230-036A EF or Form 230-036B EF. Version A should be used for the first review made on a project. Version B places more emphasis on individual pay items and should be used for the second review or on larger projects during the initial review phase where this emphasis is more appropriate.

On projects that are estimated to cost more than \$1,000,000, and require more than 35 working days to construct, the Region should conduct an interim documentation review when the project is approximately 50 percent complete. This review should be thorough and complete to ensure that the documentation records are adequate and are being properly maintained. This review should include both procedural checks for those items listed on Form 230-036A EF and detailed reviews of specific pay items for accurate documentation practices of contract payments completed to date. Audit work for pay items may also be started at this time in preparation for the Final Records Review at Physical Completion. This early audit work could consist of checking any individual items that have been fully completed. Reviews of completed items that are recorded on Form 421-014 EF, can be kept and then made a part of the Final Records check upon Physical Completion. Once the project has been completed, information from both procedural reviews and specific pay item reviews can then become a part of the *Temporary Final Records*.

On projects that are estimated to cost more than \$500,000 and require more than 100 working days to construct, the interim documentation review should be considered as early as 30 percent completion but, where possible, no later than 50 percent completion. On these larger projects, it is particularly important that the interim reviews be sufficient to verify both documentation and procedural practices. However, on many projects, the nature of the work completed at 30 percent may not provide an adequate representation of the documentation procedure to merit a documentation review. In these instances, the Region should exercise considerable judgment regarding the timing of interim documentation reviews.

The Region reviewer should also exercise considerable judgment in deciding whether or not to perform additional documentation reviews in conjunction with the reviews described above. In addition to cost and time, other criteria should also be used to evaluate the need for additional documentation reviews. This could include results of previous documentation reviews as well as the history, knowledge, and experience of the specific project office personnel involved. The Region reviewer should be satisfied on a case-by-case basis that each project's records are adequate and are being properly maintained.

It is recommended that each time a documentation review is performed on a project, that the Region reviewer discuss the results of the review with the project office staff, leaving a completed copy of Forms 230-036 EF and 431-014 EF to be included in the project temporary records.

10-5.2 Review Procedures for Final Estimates and Final Records

When work on the project is physically complete, it is important that the final records be completed and assembled in as timely a manner as possible. The final quantities should be checked and the final estimate or Final Contract Voucher Certification furnished to the Contractor as soon as is reasonably possible.

In order to facilitate this, the Project Engineer should ensure that the overall project final records, including the final contract quantities, are made ready for Region review as timely as can be and that the Region has completed their review work shortly thereafter.

The Region is responsible to ensure that the final records for the contract are complete, accurate and maintained in an orderly manner. The Region may exercise considerable judgment regarding the procedures used for this check. These procedures may include a complete check of all records or a representative sampling of records in order to validate all records maintained. If problems are discovered during the review of the representative sample, and if those problems indicate that the entire population might be flawed, then the entire population should be checked and corrected by the field office and a new representative sample taken. In conducting these final reviews the Region reviewer should mark the areas that have been checked, initialing and dating the records or portions of records that have been reviewed. The Examination Sheets for Contract Items, Form 421-014 EF, and Documentation Review (Procedures), Forms 230-036A & B EF, should be kept until the contract final records check is completed and then filed with the *Temporary Final Records* where they can be further reviewed should an audit occur.



**Washington State
Department of Transportation**

Item Quantity Ticket

Date *	Location	Group
Remarks		
Time Received	<input type="radio"/> AM <input type="radio"/> PM	Time Weighed
Received By *	Weighed By	
Pit Number	Truck Number *	
Check One * <input type="radio"/> Tons <input type="radio"/> Hours <input type="radio"/> Cu. Yds. <input type="radio"/> M. Gal. <input type="radio"/> LBS. <input type="radio"/> Each <input type="radio"/> Days	Legal Gross Weight	
	Gross *	
	Tare *	
	Net *	
Other Unit of Measure	This Load	Total

Item Identification	
Contract Number *	Item Number *
Item Description	
Subcontractor	
Contractor	
* Required Information	Ticket Number

DOT Form 422-021
Revised 4/00

Figure 10-1

Contract #6767
Johnson Creek Bridge 113/38

Columbia Basin Region

Final Records Book Number 1

<u>ITEM</u>	<u>SECTION</u>
Listing of All Final Record books	1
Listing of State Personnel	2
Comparison of Quantities	3
Final Contract Voucher	4
Contract Estimate Payment Totals	5
Affidavit of Wages Paid	6
Change Orders	7
Record of Construction Materials	8

Figure 10-2

Contract #6767
Johnson Creek Bridge 112/38
Columbia Basin Region

Permanent Final Records

(Retained at Headquarters Records Services)

<u>Book Description</u>	<u>Book No.</u>
Final Records Book No. 1	1
Project Engineers Diary	2
Inspector's Daily Reports	3
Traffic Control Reports	4
Pile Driving Records	5
Post Tensioning Records (Not used for this project)	-
Miscellaneous Records For Permanent Storage	7
As Built Plans (submitted under Separate cover dated 8/10/00)	

Temporary Final Records

(Retained Within the Region)

Description

Item Quantity Tickets
 Project Engineer's Copy of Estimates
 Inspector's Record of Field Tests
 Scaleman's Diary and Scale Checks
 Scale Test Reports
 Concrete Pour Records
 Record of Field Audits
 Surfacing Depth Check Records
 Approval of Source of Materials
 Quantity Computation Sheets
 Source document files
 Drainage Notes
 Contractor's Payrolls (Federal Aid Projects)
 Prints of Shop Drawings
 Alignment (Transit) Book
 Grade Book
 Cross-Section Notes
 Photographs
 Mass Diagrams
 Computer Summary Sheets
 Computer Listings
 Falsework and Form Plans
 Daily Report of Force Account Worked

Figure 10-3



Washington State
Department of Transportation

Field Note Record

Contract No. 4747	Station SEE DETAIL	Line L-LINE	C/S 231b
Staked By M. Lewis	Date 2-12-98	Work Started 2-5-98	Work Completed 2-9-98
Calculated By J.P.	Date 2-14-98	Checked By CB	Date 2-15-98
Inspector's Signature John Smith		Date 2-9-98	

CREW: LEWIS M, BARNES, TOMS			
WEATHER: CLEAR, COOL			
CLEARING & GRUBBING			
GROUP 1 TOTAL	21172 M ²	FROM REVERSE SIDE	= 2.12 HECTARES
GROUP 2 TOTAL	14609	FROM PAGE 4	= 1.46 HECTARES
PROJECT TOTAL	= 3.58 HECTARES		

Item No.	Material	Manufacturer	Brand Name Model/Type	RAMS/QPL Ref. No.	Appr/Accept Code	Basis of Acceptance

Item No.	Item Description	Group	Date Work Completed	Unit	Quantity	CAPS Entry No.	Posted By		Checked By		Est. No.
							Initials	Date	Initials	Date	
2	CLEARING & GRUBBING	1	2-9-98	HECTARE	2.12	7	JS	4/16	CR	4/20	1
2	" "	2	2-9-98	HECTARE	1.46	8	JS	4/16	CR	4/20	1

DOT Form 422-635 EF
Revised 3/98

Page No. _____

Figure 10-4

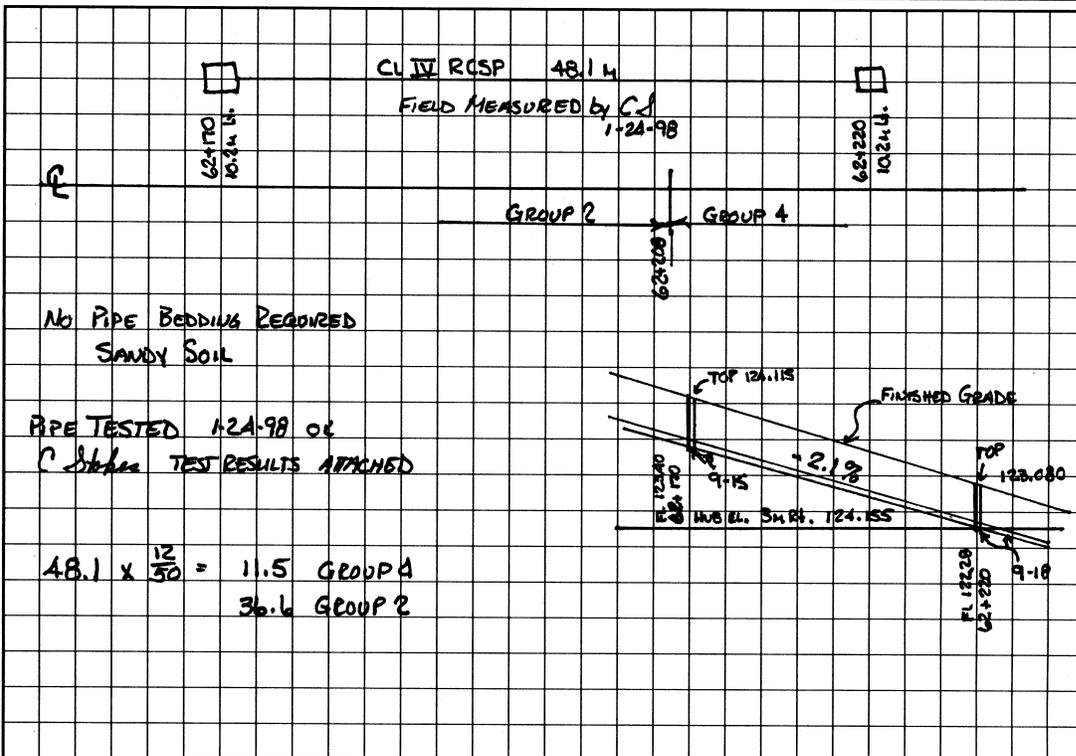


Washington State Department of Transportation

Field Note Record For Drainage

Book No. _____ Page No. _____

Contract No. 4747	Station 62+170 to 62+220	Line L LINE	C/S 1701	Code Number 9-15
Staked By T. ROBERTS	Date 1-12-98	Work Started 1-16-98	Work Completed 1-24-98	
Calculated By TMC	Date 1-26-98	Checked By DEM	Date 1-30-98	Inspector's Signature C. Stokes
		Date 1-24-98		



Item No.	Item	Group No.	Date	Unit	Quantity	RAMS No.	Basis of Material Acceptance	CAPS Entry No.	Initials		Est. No.
									Post	OK	
7	STR. EXC. CL. B	2	1/8/98	M ³	17.6			53	DS 1/19	CR 1/20	1
7	" " "	4	1/8/98	M ³	6.7			54	DS 1/19	CR 1/20	1
24	CL IV RCSP 300MM	2	1/24/98	M	36.6	4063	TAG # A123456	76	DS 1/25	CR 1/26	1
24	" " "	4	1/24/98	M	11.5	4063	TAG # A123456	77	DS 1/25	CR 1/26	1
25	TESTING SEWER PIPE	2	1/24/98	M	36.6			78	DS 1/25	CR 1/26	1
25	" " "	4	1/24/98	M	11.5			79	DS 1/25	CR 1/26	1
26	C.B. TYPE 1	2	1/24/98	EACH	1	4063	TAG # A123456	80	DS 1/25	CR 1/26	1

DOT Form 422-637 EF
Revised 9/97

Figure 10-6

Contract No. 7063		Station Project Limits		Mile/Line L-Line		C/S 320130,320105,320101,320CT,320801	
Staked By Traffic Office		Date -		Work Started 3/6/2006		Work Completed 4/5/2006	
Calculated By J. Lehman		Date 4/5/2006	Checked By		Date	Inspectors Signature	Date

The contractor has installed pole foundation and cabinet forms, conduit, and Junction boxes. (5% for Concrete not complete) See **sheet 2 for percent calculation**

Bid Item 7		CCTV/TDA SYSTEM, MP 272.79		
	Group	1	2	3
Bid Price		\$82,700.00		
Percent complete		55.0%		
Amount Complete		\$45,485.00		
Amount Paid Prior		\$4,135.00		
Pay This Estimate		\$41,350.00		




Item No.	Material Brand Name Model/Type	Manufacturer	RAMS/QPL Ref. No.	Appr/Accept Code	Basis of Acceptance	Date of Accept./ Init.
	See Sheets 3 & 4 for Materials					

Item No.	Item Description	Group	Date Work Completed	Unit	Quantity	CAPS Entry No.	Posted By Initials/Date	Checked By Initials/Date
7	CCTV/TDA SYSTEM, MP 272.79	1	4/5/2006	L.S.	\$41,350.00			

Figure 10-8

11-1	Introduction	11-1
11-2	General Instructions	11-1
11-2A	Project Office	11-2
11-2B	Regional Office	11-3
11-2C	Fabrication Inspector	11-3
11-2D	State Construction Office	11-3
11-2E	Materials Laboratory (State or Region)	11-3
11-2F	Contractor	11-4

11-1 Introduction

This chapter of the manual is published to acquaint engineers and inspectors with the various forms provided by WSDOT for their use in keeping records of the construction activities and payment for the various phases of the work.

The following pages contain a list of forms to be used in reporting project progress. The sample forms listed in this manual in the past have been eliminated. Copies of the forms are available via four different methods:

- The WSDOT Internal website at <http://wwwi.wsdot.wa.gov/fasc/AdminServices/forms/>
- The WSDOT Microsoft Outlook in the following folder: *Public Folders/All Public Folders/WSDOT/Agency Forms/Filemaker Forms/WSDOT Forms*
- The WSDOT external website at <http://www.wsdot.wa.gov/forms/>
- By ordering the forms through your WSDOT Regional Stores personnel.

Both English and Metric versions will be available until the last metric project is completed.

11-2 General Instructions

The following list of forms is categorized by the persons responsible or the offices engaged in the administration of the construction contract.

It is recommended that the on-line version be utilized, which should be the most current copy of the form, during the administration of a project.

Unless otherwise noted, the previous version of a revised form may continue to be used until the existing supply is gone. However, if the supply of the older form is not exhausted at the end of six months after the revision date shown below, the supply of old forms should be discarded and the latest version used. The latest version may also be used immediately if desired.

Blank forms should be ordered or downloaded from one of the methods listed in Section 11-1 when supplies run low rather than photocopying an existing form. This will help ensure that the latest version of the form is used.

Form numbers followed by the letters "EF" indicate that an electronic version of the form is available.

*** Indicates only forms with the revised date shown are to be used. All older forms will be discarded.**

11-2A Project Office

Form No.	Revised Date	Form Name
Administration		
410-025 EF	3/02	Transmittal of Falsework, Form, and Shop Drawings
420-012 EF	1/96	Recommended Changes to Specifications and Construction Manual
421-005 EF	4/02	Change Order – Minor Change (<u>1 page</u>)
<u>421-005A EF</u>	<u>4/02</u>	<u>Change Order – Minor Change (2 page)</u>
421-006 EF	<u>5/06</u>	Order to Suspend Work
421-007 EF	<u>5/06</u>	Order to Resume Work
421-010 EF	11/03*	Prime Contractor Performance Report
540-509 EF	3/02	Commercial Pesticide Application Record
722-025 EF	<u>4/04</u>	As Built Cover Sheet
750-001 EF	10/97	Fall Protection Plan
Aggregates		
350-023 EF	4/02	Pit Evaluation Report
422-020	5/95	Inspector's Record of Field Test
Asphalt Testing		
350-016	4-02	Asphalt Sample Label
350-126 EF	8/97	Asphalt Plant Inspection
350-157 EF	4/02	Rice Density
350-161 EF	<u>3-07</u>	<u>HMA Mineral Aggregates</u>
350-162 EF	<u>3-07</u>	Field Volumetrics Worksheet
350-560 EF	5-02	Ignition Furnace Worksheet
Concrete Testing		
350-009 EF	7/02	Concrete Cylinder Transmittal
450-001 EF	1/96	Manufacturer's Certificate of Compliance for Ready Mix Concrete
DBE/EEO		
272-051 EF	<u>6/07</u>	<u>MBE/DBE/WBE On-Site Review</u>
272-060 EF	12/04	Federal-Aid Highway Construction Annual Project Training Report
226-012 EF	<u>5/06</u>	Trainee Interview Questionnaire
424-003 EF	12/96	Employee Interview Report
Density (Asphalt / Soils)		
350-073	<u>1/07</u>	<u>Hot Mix Asphalt</u> Test Section Report
350-074 EF	5/02	Field Density Test Report
350-092 EF	3/02	Asphalt Concrete Pavement Compaction Control Report
351-015 EF	<u>6/07</u>	<u>Hot Mix Asphalt Compaction Report</u>
Documentation		
134-146 EF	<u>6/07*</u>	Final Contract Voucher Certificate
350-115 EF	<u>3/02</u>	Contract Materials Checklist
410-027 EF	4/02	Test Pile Record
422-007 EF	3/98	Report of Protested Work
422-008 EF	3/98*	Daily Report of Force Account Worked
422-009 EF	2/96	Final Record Notes Title Page
422-009B EF	2/96	Final Record Notes Title Page
422-010 EF	<u>2/06*</u>	Force Account Equipment Rate Request
422-012 EF	4/01	Title Sticker – Final Record Books
422-021	4/00	Item Quantity Ticket
422-024	7/95	Water Delivery Record
422-568 EF	4/01	Load Tally Sheet
422-635 EF	3/98	Field Note Record
422-636 EF	9/96	Field Note Record (Sketch Grid)
422-637 EF	9/97	Field Note Record for Drainage
422-700 EF	8/99	Daily Work Quantities
450-004	12/95	Pile Book
591-020 EF	1/02	Daily Traffic Item Ticket

General Materials

350-026 EF	5/02	Preliminary Sample Transmittal
350-056 EF	9/02	Sample Transmittal
350-114 EF	4/02	Summary Report of Acceptance Sampling and Testing
350-130 EF	<u>4-07</u>	<u>Field Acceptance/Verification Report (RAM/QPL)</u>
350-564 EF	1/96	Gradation <u>Chart – 0.45 Power</u>
350-572 EF	6/04	Manufacturer's Certificate of Compliance Checklist
722-025 EF	<u>4/04</u>	As Built Cover Sheet

Inspection

421-045 EF	2/97	WSP Field Check List
422-004 EF	<u>4/07</u>	Inspector's Daily Report
422-004A EF	<u>1/94</u>	Inspector's Daily Report (page 2)
422-004B EF	3/02*	(Street) Inspector's Daily Report
422-027 EF	9/02	Scaleman's Daily Report
422-644 EF	12/95*	Daily Report of BST Operations
540-020 EF	3/02	Backflow Prevention Assembly Test Report

11-2B Regional Office

Form No.	Revised Date	Form Name
230-036A EF	<u>4/07</u>	Initial Documentation Review (Procedures)
230-036B EF	<u>3/07</u>	Follow-Up Documentation Review
272-061 EF	<u>8/03</u>	Federal-Aid Highway Construction Cumulative Training Report
420-012 EF	1/96	Recommended Changes to Specifications and Construction Manual
421-014 EF	1/97	Examination Sheet for Contract Items
422-100 EF	6/03	<u>Interim</u> Inspection of Federal-Aid Project
FHWA-1392	3/92	Federal-Aid Highway Construction Summary of Employment Data

11-2C Fabrication Inspector

Form No.	Revised Date	Form Name
350-004 EF	5/02	Fabrication Progress Report
450-005 EF	3/02	Post-Tensioning Record

11-2D State Construction Office

Form No.	Revised Date	Form Name
422-101 EF	<u>6/07</u>	Final Inspection <u>and Acceptance</u> of Federal-Aid Interstate Project
FHWA-1392	3/92	Federal-Aid Highway Construction Summary of Employment Data

11-2E Materials Laboratory (State or Region)

Form No.	Revised Date	Form Name
350-010 EF	<u>3/99</u>	Concrete Batch Plant Inspection Checklist
350-112 EF	3/02	Correlation — Nuclear Gauge to Core Density
350-514 EF	4/97	Moisture – Density Relationship Report
350-564 EF	1/96	Gradation <u>Chart – 0.45 Power</u>
351-021 EF	4/02	Statement of Receipt of Radioactive Material

11-2F Contractor

Form No.	Revised Date	Form Name
134-146 EF	<u>6/07</u>	Final Contract Voucher Certificate
272-049 EF	<u>1/07</u>	Training Program
272-050 EF	4/02	Apprentice/Trainee Approval Request
272-062 EF	6/98	Contract Compliance Review Request for Additional Information
350-040 EF	<u>6/06</u>	Proposed Mix Design
350-042 EF	<u>2/07</u>	HMA Mix Design Submittal Form
350-071 EF	<u>3/07*</u>	Request for Approval of Material
350-109 EF	8/03	Certification of Materials Origin
410-029 EF	5/01	Contractor's Construction Process Evaluation
420-004 EF	10/94*	Contractor and Subcontractor or Lower-Tier Subcontractor Certification for Federal-Aid Projects
421-009 EF	3/02	Release — Retained Percentage (Except Landscaping)
421-012 EF	7/02*	Request to Sublet Work
421-023 EF	4/00*	Annual Report of Amounts Paid MBE/WBE Participants
421-040A <u>EF</u>	4/04	Contractor's Daily Report of Traffic Control - Summary
421-040B <u>EF</u>	9/04	Contractor's Daily Report of Traffic Control - Traffic Control Log
422-102 EF	<u>2/06</u>	Quarterly Report of Amounts Credited as DBE Participation
540-509 EF	3/02	Commercial Pesticide Application Record
820-010 EF	6/99*	Monthly Employment Utilization Report
FHWA-1391	3/92	Federal-Aid Highway Construction Contractor's Annual <u>EEO</u> Report

Alphabetical Listing of Forms

Form No.	Form Name
350-161 EF	<u>HMA</u> Mineral Aggregates
421-023 EF	Annual Report of Amounts Paid as MBE/WBE Participants
272-050 EF	Apprentice/Trainee Approval Request
722-025 EF	As Built Cover Sheet
350-092 EF	<u>Hot Mix Asphalt Compaction Report</u>
350-073 <u>EF</u>	<u>Hot Mix Asphalt</u> Test Section Report
350-126 EF	Asphalt Plant Inspection
350-016	Asphalt Sample Label
540-020 EF	Backflow Prevention Assembly Test Report
350-109 EF	Certification of Materials Origin
421-005 EF	Change Order - Minor Change (<u>1 page</u>)
<u>421-005A EF</u>	<u>Change Order – Minor Change (2 page)</u>
540-509 EF	Commercial Pesticide Application Record
350-010 EF	Concrete Batch Plant Inspection Checklist
350-009 EF	Concrete Cylinder Transmittal
272-062EF	Contract Compliance Review Request for Additional Information
350-115 EF	Contract Materials Checklist
420-004 EF	Contractor and Subcontractor or Lower-Tier Subcontractor Certification for Federal-Aid Projects
410-029 EF	Contractor's Construction Process Evaluation
421-040A <u>EF</u>	Contractor's Daily Report of Traffic Control - Summary
421-040B <u>EF</u>	Contractor's Daily Report of Traffic Control - Traffic Control Log
350-112 EF	Correlation — Nuclear Gauge to Core Density
351-015 EF	Daily Compaction Test Report
422-008 EF	Daily Report of Force Account Worked
422-644 EF	Daily Report of BST Operations
591-020 EF	Daily Traffic Item Ticket
422-700 EF	Daily Work Quantities
424-003 EF	Employee Interview Report
421-014 EF	Examination Sheet for Contract Items
350-004 <u>EF</u>	Fabrication Progress Report
750-001 EF	Fall Protection Plan
272-060 EF	Federal-Aid Highway Construction Annual Project Training Report
FHWA-1391	Federal-Aid Highway Construction Contractors' Annual EEO Report
272-061 EF	Federal-Aid Highway Construction Cumulative Training Report
FHWA-1392	Federal-Aid Highway Construction Summary of Employment Data

350-130 EF	Field Acceptance/ <u>Verification</u> Report (<u>RAM/QPL</u>)
350-074 EF	Field Density Test
422-635 EF	Field Note Record
422-637 EF	Field Note Record for Drainage
422-636 EF	Field Note Record (Sketch Grid)
350-162 EF	Field Volumetrics Worksheet
422-101 EF	Final <u>Inspection and</u> Acceptance of Federal-Aid Interstate Project
134-146 EF	Final Contract Voucher Certificate
422-009 EF	Final Record Notes Title Page
422-009B EF	Final Record Notes Title Page
230-036B EF	Follow-Up Documentation Review
422-010 EF	Force Account Equipment Rate Request
350-042 EF	HMA Mix Design Submittal Form
350-564 <u>EF</u>	Gradation Chart— <u>0.45 Power</u>
350-560 EF	Ignition Furnace Worksheet
230-036A EF	Initial Documentation Review (Procedures)
422-100 EF	Inspection of Federal-Aid Project
422-004 EF	Inspector's Daily Report
422-004A EF	Inspector's Daily Report
422-004B EF	Inspector's Daily Report
422-020	Inspector's Record of Field Test
422-021	Item Quantity Ticket
422-568 EF	Load Tally Sheet
272-051 EF	M/D/WBE On-Site Review
350-572 EF	Manufacturer's Certificate of Compliance Checklist
450-001 EF	Manufacturer's Certificate of Compliance for Ready Mix Concrete
350-514 EF	Moisture – Density Relationship Report
820-010 EF	Monthly Employment Utilization Report
350-054 EF	Monthly Progress Sampling and Inspection Report
421-007 EF	Order to Resume Work
421-006 EF	Order to Suspend Work
450-004	Pile Book
350-023 <u>EF</u>	Pit Evaluation Report
450-005 EF	Post-Tensioning Record
350-026 EF	Preliminary Sample Transmittal
421-010 EF	Prime Contractor Performance Report
350-040 EF	Proposed Mix Design
422-102 EF	Quarterly Report of Amounts Credited as DBE Participation
420-012 EF	Recommended Changes to Specifications and Construction Manual
421-009 EF	Release — Retained Percentage (Except Landscaping)
422-007 EF	Report of Protested Work
350-071 EF	Request for Approval of Material
421-012 EF	Request to Sublet Work
350-157 EF	Rice Density
350-056 EF	Sample Transmittal
422-027 EF	Scaleman's Daily Report
351-021 <u>EF</u>	Statement of Receipt of Radioactive Material
350-114 <u>EF</u>	Summary Report of Acceptance, Sampling and Testing
410-027 <u>EF</u>	Test Pile Record
422-012 EF	Title Sticker — Final Record Books
226-012 EF	Trainee Interview Questionnaire
272-049 EF	Training Program
410-025 EF	Transmittal of Falsework, Form, and Shop Drawings
422-024	Water Delivery Record
421-045 EF	WSP Field Check List

A

Acceptance of concrete, 6-8
Acceptance samples and tests, 9-1
Acid soil/alkaline soil, 8-6
Admixtures, 9-29
Aeration, 2-6
Aerial photographs, 2-11
Affidavit of wages paid, 1-76
Aggregates for asphalt concrete and asphalt treated base, 9-14
Air entraining admixtures and water reducing admixtures, 9-29
Anchor, 9-32
Anchor bolts, 6-23, 9-32
Anchor bolts for luminaire, signal poles, and sign, 9-32
Approval of materials, 9-6
As-built plans, 8-21
Asphalt concrete and asphalt treated base, 9-15
Assurance samples testing, 9-44

B

Backfill, 9-15
Backflow, 8-17
Balled and burlapped, 8-6
Bank run gravel, 9-15
Bare root, 8-6
Barrier, 6-15
Basis for acceptance, 9-38
Beam guardrail, guardrail anchors, and glare screen, 9-27
Bearing values, 6-2, 6-31
Bituminous materials, 9-12
Bituminous surface treatment, 5-1
Bolts, 9-20
Borrow pits, 2-8
Bridge approach slab anchors, 9-22
Bridge deck construction, 6-9
Bridge rail, 9-34
Bridge railings, 6-35
Bud, 8-6
Bulk specific gravity, 6-36

C

Calendar cutoff dates, 5-7
Caliper, 8-6
Cane, 8-6
Cast-in-place concrete piling, 6-31
Castings, 9-18
Catch basins, 9-24
Cement concrete pavement, 5-19

Chain link fence, 8-19
Change order - checklist, 1-35
Change order executed by ferries, 1-38
Change order executed by the region, 1-35
Changes in the work, 1-29
Channel excavation, 2-14
Claims, 1-77
Cleaning metal, 6-35
Clearing, 2-1, 8-19
Clearing and grubbing - combined, 2-1
Clearing the site, 6-2
Cofferdams, 2-13
Compaction, 2-6
Compaction control, 5-17
Compression seals, 9-16
Concrete, 9-35
Concrete aggregates, 9-13
Concrete culvert, sewer, drain, and underdrain pipe, 9-17
Concrete curing compounds, 9-29
Concrete pipe acceptance report, 9-10
Concrete seals and cofferdams, 6-12
Concrete structures, 6-4, 6-13
Conduit, 8-22, 8-23, 9-31
Construction Engineer, Administration, 1-1
Construction Engineer, Bridge, 1-37
Construction Engineer, Roadway, 1-37
Construction geotextiles, 9-34
Construction joints, 5-24
Construction staking, 1-81
Contraction joints, 5-23
Contraction WSDOT relationships, 1-7
Contractor furnished material sources, 3-3
Contractor furnished sources, 3-4
Controlled blasting, 2-3
Control of materials, 9-11, 9-37
Control of Work, 1-67
Credit, 3-3
Cross-connection control, 8-17
Crushed, 3-1
Crushing, 3-1
Culvert, 9-17
Curing, 5-23
Curing concrete, 6-11

D

Daily compaction reports, 2-8
Defective materials, 1-68
Defective or unauthorized materials or work, 1-68
Direct tension indicator method, 6-27, 6-28
Disputes and claims, 1-76

Ditch, 2-14
Dowels and tiebars for concrete pavement, 9-21
Drain pipe, 9-17
Duct, 6-19
Duties before construction begins, 5-4
Duties before paving begins, 5-10
Duties during paving operations, 5-11

E

Earth embankments, 2-8
Earthwork quantities, 2-10
Elastomeric bearing pads, 9-33
Electrical conductors, 9-31
Embankment construction, 2-5
Embankment foundations, 2-5
Environmental considerations, 1-15
Epoxy coated reinforcing steel bars for concrete, 9-21
Epoxy resins, 6-10
Equipment for testing, 9-56
Erection of steel, 6-24
Erosion control, 2-9
Erosion of slopes, 2-4
Evaluation of independent assurance samples testin,
9-44
Excavation, 2-2
Expansion dams, 6-3, 6-29
Expansion joints, 9-35

F

Fabric bearings pad, 9-33
Falsework, 6-4
Fencing, 9-27
Fertilizer, 8-7, 8-13, 9-26
field notes, 10-1
Final cleanup, 6-4
Finishing, 6-10
Fly ash, 6-4
Form letters, 9-1
Foundations, 6-1
Frequency of testing, 9-37

G

Gabion baskets, 9-31
Galvanized steel, aluminized steel and aluminum
corrugated metal culvert, drain pipe and
perforated underdrain pipe, 9-17
Genus, 8-6
Geotextiles, 9-34
Girders, 6-17, 6-18
Gravel backfill for walls, 2-14
Gravel base, 9-15
Gravel borrow, 2-6, 9-16
Grubbing, 2-1

Guardrail, 8-18, 9-27
Guardrail posts and blocks, 9-27
Guidelines for job site control of materials, 9-37

H

Handling and storing material, 6-23
Haul, 2-11
High-strength bolts, 6-27
High strength bolts, nuts and washers, 9-20
Hot plant inspection, 5-7

I

Illumination, 8-20
Independent assurance program, 9-39
Inlets, 9-24
Inspection and sampling of materials, 5-3
Inspection during mixing operations, 5-9
Inspection during planting, 8-11
Inspection of bituminous surface treatment,
Class A, 5-2
Class B, C, & D, 5-3
Inspection of concrete production facilities, 6-4
Inspection of mixing plant, 5-8
Inspection of planting, 8-8
Inspection of trucks, 6-6
Inspection tools, 5-10
Inspector's duties, 3-2
Inspector's record of field tests, 3-1
Inventory inspection, 6-4
Irrigation, 8-14
Irrigation system, 8-15, 9-26

J

Joint filler, 9-16
Joints, 5-23
Junction boxes, 8-22

L

Landscape, 8-6
Layout, 6-23
Lighting standards, 8-22
Luminaires and lamps, 9-32

M

Manholes, 9-24
Manufacturer's certificate of compliance, 9-9
Maximum density, 2-7
Mechanical splices, 9-21
Metal culvert, 9-17
Metric Designed Projects Administered with English,
1-47
Mineral filler, 9-15

Miscellaneous deductions, 1-72
Miscellaneous duties of the street inspector, 5-17
Miscellaneous inspection duties, 5-4
Mix design, 6-4
Mixing, 5-20
Moisture content, 2-6
Mudsills, 6-3
Mulch, 8-8, 9-26

N

Node, 8-8
Nuclear density gauge, 9-57

O

Optimum moisture, 2-7
Order list, 6-31
Overbreak, 2-4
Overburden, 3-2
Overrun of plan quantity, 1-30

P

Painting, 6-30, 6-35
Paints for structures, 9-23
Paving equipment, 5-10
Payment for shoring or extra excavation, 1-71
Payment for surplus processed material, 1-72
Payroll, 1-59
Pedestrian safety, 1-15
Perforated underdrain pipe, 9-18
Performance reports, 1-70
Pesticide, 8-8
Photogrammetry, 2-11
Pier, column, and wall concrete, 6-13
Pile driving records, 6-34
Piling, 6-30, 9-24
Pipe, 9-17
Pipe zone bedding, 9-16
Pit, 3-1
Pit evaluation report, 3-2
Pit operations, 3-2
Pit run aggregates, 9-16
Placement, 6-7
Placing concrete roadway slab, 6-29
Plant establishment, 8-14
Planting, 8-5
Plant inspector, 5-9
Plant inspectors checklist, 5-7
Plant material, 8-13, 9-25
Plastic waterstop, 9-30
Point of acceptance, 6-9
Portland Cement, 9-12
Post-tensioned bridges, 6-19
Post-tensioning record, 6-22

Post-tensioning reinforcement, 9-22
Poured joint sealant, 9-17
Precast concrete barrier, 9-33
Precast concrete catch basins, manholes, and inlet, 9-24
Precast concrete piling, 6-31
Preleveling, 5-11
Preliminary samples and tests, 9-1
Preparation of untreated roadway, 5-11
Prestressed concrete, 9-28
Prestressed concrete products, 6-18, 9-28
Production, 3-1
Progress schedule, 8-14
Project documentation reviews, 10-13
Proportioning and mixing concrete, 6-4
Pruning, 8-13
Public convenience and safety, 1-19

Q

Quarry, 3-1

R

Railings, 6-35
Railroad Agreements, 1-12
Railroad flagging, 1-73
Raised pavement markers, Types 1, 2, and 3, 9-28
Record of materials, 9-6
Records of construction signing, collisions, and su, 1-27
Reinforcing steel, 6-15
Removal of structures and obstructions, 2-2
Reports and records, 5-4
Request for approval of material, 9-6
Request to sublet, 1-46
Required contract provisions for federal-aid const, 1-59
Required tests, 5-7
Resins, 9-30
Responsibility of the street inspector, 5-9
Roadside cleanup, 2-1
Roadway excavation and embankment, 2-2
Rock embankments, 2-8
Rollers, 5-15
Rust, 6-35

S

Safety bars, 9-34
Safety nets and staging, 6-3
Safety tags, 8-23
Sales tax, 1-44
Sampling and testing for small quantities of materials, 9-37
Sand equivalent test, 3-1
Sanitary sewers, 9-19
Scalping, 3-2
Scour, 6-1

Screen analysis for gradation, 3-1
Seal coat, 5-3
Seals, 6-12
Seed, 9-25
Segregation, 3-2, 6-7
Setting anchor bolts and masonry plates, 6-23
Settlement indicating devices, 2-5
Shear keys, 6-7
Shop drawings, 8-20
Shop inspection of prestressed concrete products, 6-19
Sidewalks, 8-19
Signal, luminaire, and strain poles, 9-32
Significant decimal places, 10-2
Signing, 8-23
Sign posts, 9-34
Sign structures, 9-32
Site reclamation, 3-4
Slides, 2-4
Slipform, 6-15
Slope protection, 9-24, 9-25
Slope treatment, 2-11
Slump, 6-8, 9-35
Small quantities, 9-37
Solid rock, 2-3
Specific gravity, 3-3, 9-58, 9-59
Specific requirements for each material, 9-11
Speed limit, 1-27
Speedy moisture tester, 2-7
Splices, 6-16
Spreading and finishing, 5-12
Steel for bridges, 9-19
Steel piling, 6-31
Steel structures, 6-22
Stockpiling, 3-3
Straightening bent material, 6-23
Street inspectors checklist, 5-9
Stress absorbing membranes, 5-4
Strippings, 3-1
Structural plate pipes and arches, 9-18
Structural timber and lumber - untreated, 9-23
Structure excavation, 2-12
Structures, general requirements, 6-1
Subcontractors and lower tier subcontractors, 1-7
Subgrade preparation, 2-12
Supplemental final estimates, 1-75
Surface Mining Act, 3-4
Surface smoothness, 5-14
Surfacing aggregates, 9-14
Suspension of work and delay, 1-54

T

Temporary water pollution/erosion control, 2-9
Tendon, 6-19
Test borings, 6-1
Test cylinders, 6-12
Testing equipment, 5-7, 5-25
Testing modules, 9-58
Test methods for materials, 9-57
Test numbering, 9-1
Test piles, 6-34
Tie/dowel bars, 5-22
Timber, 9-23
Timber structures, 6-30
Tolerance limits, 9-46
Traffic control, 5-10
Traffic signal systems, 8-22
Treated timber piling, 6-30
Tremie, 6-12
Trimming and cleanup, 2-14
Turn-of-nut method, 6-27

U

Underground utilities, 1-12
Unfinished cement concrete pavement, 5-24
Unsuitable foundation, 2-5

V

Verification samples and tests, 9-1
Vibration, 6-6

W

Waste sites, 3-5
Water, 2-13
Water distribution system, 9-33
Water pipe, 9-27
Waterproofing, 6-36
Weather and temperature limits, 6-7
Weed control, 5-17
Weekly statements of working days, 1-54
Weep holes, 2-14
Weighing, 10-4
Welding of structural steel, 6-29
Welding reinforcing steel, 6-18
Wire fence, 8-19
Wire reinforcement for concrete, 9-22
Wiring, 8-22
Working in water, 6-3
WSDOT furnished material sources, 3-2
WSDOT furnished sources, 3-5