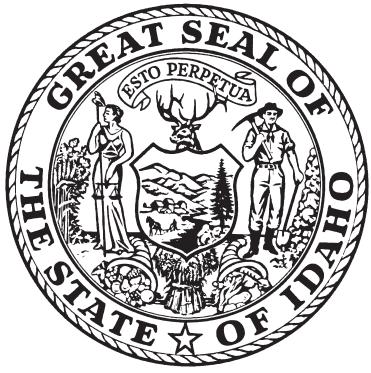
Standard Specifications for Highway Construction



Edition of 2004

State of Idaho
Transportation Department
Boise, Idaho

SYMBOLS

°C	degrees Celsius
cd	candelas
g	gram
ha	hectare
HU	hectare unit
kg	kilogram
km	kilometer
km^2	square kilometer
km/h	kilometers per hour
kPa	kiloposcal
L	liter
lx	lux
m	meter
m^2	square meter
m^3	cubic meter
ml	mililiter
mm	millimeter
mm^2	square millimeter
mm^3	cubic millimeter
MPa	megapascal
MSTA	metric station
MTOA	metric ton of asphalt
MTU	metric ton unit
MU	meter uit
MUN	metric unit
N	Newton
N•m	Newton meter
N/m	Newtons per meter
Pa	Pascal
s	second
t	metric ton
J	joule

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SECTION 100 - GENERAL PROVISIONS

SECTION 101 - DEFINITION OF TERMS

In these specifications the following definitions shall apply:

101.01 Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standard Institute
AREA	American Railway Engineering Association
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWS	American Welding Society
IES	Illuminating Engineering Society
NRMCA	National Ready Mix Concrete Association
PCI	Prestressed Concrete Institute
SAE	Society of Automotive Engineers
SSPC	Steel Structures Painting Council

101.02 Definitions.

Actual Cost. All out of pocket costs to the prime or lower tier contractor performing certain work exclusive of profit.

Administrator. State Highway Administrator.

Bidder. An individual, firm, corporation, partnership, or any acceptable combination thereof, submitting a proposal.

Board. Idaho Transportation Board.

Bridges. Structures of over 20 ft. (6.1 m) span, measured under bridge seat or coping along the centerline of the road, or between inside faces of end supports, also multiple-span structures where the distance face-to-face between end supports,

measured as above, is in excess of 20 ft. (6.1 m). Bridges shall be considered to include grade separation structures.

Calendar Days. Any day shown on the calendar, beginning and ending at midnight.

Central Materials Laboratory. The Department's Headquarters Materials Testing Laboratory located at the following address:

3293 Jordan
Boise, ID 83703

Contingency Item (Amount). A specific type of work for which an estimated price is pre-entered by the state. Authorized work performed under a contingency item will be paid for as specified.

Contract. The written agreement between the state and the Contractor covering the performance of the work.

Work Within the Scope of the Contract. All work required by the plans, specifications and special provisions, and all other work required to complete the project in a workmanlike manner. The contract shall include the notice of letting, the proposal, plans, specifications, supplemental specifications, special provisions and the contract bonds; also any and all contract change orders.

Change Order. A written order to the Contractor, covering changes in the plans, specifications, or quantities, within the scope of the contract, and establishing the basis of payment and time adjustments for the work affected by the changes.

Contract Bonds. Statutory bonds, executed by the Contractor and the Surety, including the performance bond and payment bonds, guaranteeing performance of the contract and payment of all lawful indebtedness pertaining thereto.

Contract Item (Major Work and Pay Item). A specific unit of work for which a price is provided in the contract. Each individual work item is considered as a major item of work.

Contract items are numbered to correspond to sections of these specifications, except for items covered only in the Special Provisions which are given an "SP" number.

-Special Provisions for Roadway SP-
-Special Provisions for Bridge SPB-

Contract Time. Date, number of working days, or calendar days allowed to complete the contract.

Contractor. The individual, partnership, firm, corporation, or any acceptable combination thereof, contracting with the Idaho Transportation Department, for performance of prescribed work.

Critical Habitat. Any public wildlife refuge and the specific areas within the geographical area occupied by a species of plant or animal, at the time it is listed as a threatened or endangered species, on which are found those physical or biological features essential to the conservation of the species. Those areas as above which may require special management considerations or protection and specific areas outside the geographical area occupied by a species at the time it is listed upon a determination by the Director of the U.S. Fish and Wildlife Service that such areas are essential for the conservation of the species.

Cultural Resource. Site, structure, object, and district significant in history, architecture, archeology or culture that are on or eligible for the National Register of Historic Places.

Culverts. Any structure under the roadway with a clear opening of 20 ft. (6.1 m) or less measured along the center of the roadway.

Department. Idaho Transportation Department.

District Engineer. An authorized representative of the state having general supervision over construction and maintenance work in one of the several districts of the Department. The boundaries of the districts are on file in the office of the Department.

Engineer. Whenever reference is made in these specifications to “Engineer” it shall mean the administrator acting either directly or through an authorized representative within the limits of the authority granted by the administrator.

Equipment. All machinery and equipment, together with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for the proper construction and acceptable completion of the work.

Erodible Material or Surface. Exposed earthen material, except solid rock, that may be carried or displaced by wind, rainfall, snow melt, or mechanically applied water.

Extra Work. Work not provided for in the contract as awarded but found essential to satisfactory completion of the contract within its intended scope.

Foundations for Structures. The naturally occurring material, either in situ or imported upon which the structure rests.

Highway. The entire right-of-way.

Holidays. In the state of Idaho, holidays occur on: New Year's Day, Martin Luther King Jr./Idaho Human Rights Day, President's Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day and Christmas, or on any day proclaimed as a holiday by legal authority.

Inspector. An authorized representative of the state assigned to make inspections of the work.

Laboratory. A qualified laboratory is a laboratory used for sampling and testing of materials that has been qualified through appropriate programs as determined by the Department. An independent laboratory is a laboratory that is not owned or controlled by the contractor or the Department, which is qualified. The materials laboratory of the Department and any other testing laboratory designated.

Materials. Any substance specified for incorporation in the project.

Notification of Award. Written notice to the Contractor to begin the contract work, including the date of beginning of contract time.

Overburden. Surface soil or granular material which may or may not be suitable for construction purposes and which overlays other material suitable for road or bridge construction.

Payment Bond. A statutory bond carried by a Contractor to guarantee payment to claimants who have furnished labor and/or materials and payment for taxes incurred in the execution of the contract.

Plans. Approved drawings or reproduction of approved drawings included in the contract.

Professional Engineer. An engineer licensed in accordance with Idaho Code to practice the profession of engineering in the State of Idaho.

Project. The section of highway or that area as shown by the plans, within which work is to be performed.

Proposal. The bidder's offer to perform the work.

Proposal Guaranty. The required security submitted with the proposal to ensure execution of the contract and execution of the bond for the performance of the work if the proposal is accepted.

Reasonably Close Conformity. Means compliance with reasonable and customary manufacturing and construction tolerances where working tolerances are not specified. Where working tolerances are specified, reasonably close conformity means compliance with such working tolerances.

Recreational Resource. Any publicly owned site that is used solely for recreational purposes.

Regulatory Floodway. The area regulated by federal, state or local requirements; the channel of a river or other watercourse and the adjacent land areas that must be reserved in an open manner, i.e., unconfined or unobstructed, either horizontally or vertically, to provide for the discharge of the base flood so the cumulative increase in water surface elevation is no more than a designated amount.

Roadbed. That portion of the graded roadway upon which the subbase, base, surfacing, pavement, shoulders, curb, sidewalks, median, or other incidental facilities are constructed.

Roadside. The area adjoining the outer edge of the roadway within the right-of-way. Areas between the roadways of a divided highway shall also be considered roadside.

Roadway. That portion of the highway within the limits of construction.

Shoulder. The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

Special Provisions. Additions and revisions to the Standard and Supplemental Specifications covering conditions peculiar to an individual project.

Specifications. All provisions and requirements contained herein, together with all amendments thereto.

Specialty Item. An item designated in the bid schedule as a "Specialty Item" and which is not chargeable to subcontract percentages.

State. The state of Idaho acting through its transportation board.

Structures. Structures shall consist of bridges, culverts, headwalls, retaining walls, cribbing, riprap, underdrains, pipelines, buildings, catch basins, manholes and any incidental construction not otherwise defined herein.

Subcontractor. The individual, firm, Professional Service providers, or corporation to whom the Contractor sublets part of the contract.

Sub-subcontractor. The individual, firm, Professional Service providers, or corporation to whom the subcontractor sublets part of the subcontract.

Subgrade. The surface of the roadbed or that surface noted as "subgrade" on the typical section.

Substructure. That part of the structure below the bridge seats, below the skewbacks of arches, below the top of footings of rigid frames, below the top of caps of trestle bents, or below the top of columns on box girders. Wingwalls and backwalls of abutments shall be considered as part of the substructure.

Superintendent. The Contractor's authorized representative in responsible charge of the work.

Superstructure. That part of the structure not defined as substructure.

Supplemental Specifications. Specifications adopted subsequent to the publication of this book. Supplemental Specifications shall prevail over the Standard Specifications.

Surety. The corporation, firm, partnership, or individual providing the contract bonds furnished by the Contractor.

Topsoil. Surface soil which is suitable for the germination of seeds and the support of vegetative growth.

Traffic Control Device. Traffic control devices are all signs, signals, markings, and devices placed on, over, or adjacent to a street or highway by authority of a public body or official having jurisdiction to regulate, warn or guide traffic.

Traffic Lane. The portion of the traveled way for the movement of a single line of vehicles.

Traveled Way. The portion of the roadway for the movement of vehicles, exclusive of shoulders.

Wetland. Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Work. Work shall mean the furnishing of all labor, materials, equipment, and other incidentals necessary or convenient to the successful completion of the project, and the carrying out of all the duties and obligations imposed by the contract.

Working Day. Any day except Saturdays, Sundays, and State recognized legal holidays on which weather or other conditions not under control of the Contractor will permit activities on the critical path to proceed for at least 5 hours of the day. Activities shall include, but are not limited to: engineering, surveying, permitting, submittals, approvals, procurement, fabrication, and construction.

101.03 Implied Terms. In order to avoid cumbersome and confusing repetition of expressions in these specifications, it is provided that whenever anything is, or is to be, done, if, as, or when, or where contemplated, required, determined, directed, specified, authorized, ordered, selected, furnished, given, designated, indicated, considered

necessary, necessary, permitted, reserved, suspended, established, approval, approved, disapproved, acceptable, unacceptable, suitable, accepted, satisfactory, unsatisfactory, sufficient, insufficient, rejected, or condemned, it shall be understood as if the expression were followed by the words "by the Engineer" or "to the Engineer."

101.04 Subheadings. The subheadings printed in these specifications are intended for convenience of reference only and shall not be considered as having any bearing on the interpretation thereof.

SECTION 102 - BIDDING REQUIREMENTS AND CONDITIONS

102.01 Contents of Proposal Forms. Upon request, the state will furnish the prospective bidder with a proposal form. This form will state the location and description of the contemplated construction, will show the estimated quantities of the kinds of work to be performed, and will have a schedule of items for which unit bid prices are invited. The proposal form will state the time in which the work shall be completed, the amount of the proposal guaranty, and the date, time and place of the opening of proposals. The form will also include any special provisions or requirements which vary from or are supplemental to the Standard Specifications.

All papers bound with or attached to the proposal form are considered a part thereof and shall not be detached or altered when the proposal is submitted.

The plans, specifications and other documents designated in the proposal form will be considered a part of the proposal whether attached or not.

The prospective bidder will be required to pay the state the sum stated in the Notice to Contractors for each set of proposal forms and each set of plans.

102.02 Interpretation of Quantities in Bid Schedule. The quantities appearing in the bid schedule are approximate only and are prepared for the comparison of bids. Payment to the Contractor will be made only for the actual quantities of work performed and accepted in accordance with the contract. The scheduled quantities of work to be done may be increased, decreased, or omitted as hereinafter provided.

102.03 Examination of Plans, Specifications, Special Provisions, and Site of Work. The bidder is expected to examine carefully the site of the proposed work, the proposal, plans, specifications, Supplemental Specifications, Special Provisions, and contract forms before submitting a proposal. The submission of a bid will be prima

facie evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the plans, specifications, Supplemental Specifications, Special Provisions, and terms of the contract.

Boring logs, laboratory reports and other records of subsurface investigations are available for inspection by bidders. It is understood that such information was obtained and is intended for state design and state estimating purposes only.

Oral explanations, instructions and interpretations given to bidders prior to award of contract will not be binding. It is the Department's intent to provide all bidders equal opportunity to access and acquire all available pertinent information necessary to formulate a responsive bid. Any information, specifications, plans, data or interpretations which the Department discovers is lacking and may be important to all bidders will be furnished to all bidders in the form of an addendum, the receipt of which shall be acknowledged.

102.04 Preparation of Proposal. The bidder shall submit the bid proposal on the forms furnished by the Department. In the bid schedule, the bidder shall specify a unit price in figures for each pay item for which a quantity is given and show the products of the respective unit prices and quantities written in figures in the column "Amount Bid," and the total amount of the bid obtained by adding the amounts of the several items. In the event of a discrepancy between unit bid prices and extensions, the unit bid price shall govern. All figures shall be written in ink or typed.

Penciled entries will not be accepted. If entries are in pencil, the bid proposal shall be considered irregular and the bid will be rejected. If alternate items appear in the proposal, the Contractor shall submit a bid on only one of the alternate items shown.

The bidder's proposal shall be signed with ink by the individual, by one or more members of the partnership, by one or more members or officers of each firm representing a joint venture, by one or more officers of a corporation, or by an agent of the bidder legally qualified and acceptable to the state. If the proposal is made by an individual, that individual's name and post office address shall be shown; by a partnership, the name and post office address of each partnership member shall be shown; as a joint venture, the name and post office address of each member or officer of the firms represented by the joint venture shall be shown; by a corporation, the name of the corporation and the business address of its corporate officials shall be shown.

102.05 Irregular Proposals. Proposals will be considered irregular and shall be rejected for the following reasons:

1. If the proposal is on a form other than that furnished by the state; or if the form is altered or any part thereof is detached.

2. If there are unauthorized additions, conditional or alternate bids, omission of addenda, or irregularities of any kind which tend to make the proposal incomplete, indefinite, or ambiguous as to its meaning.

3. If the bidder adds any provisions reserving the right to accept or reject an award, or to enter into a contract pursuant to an award, except when such provision is made in accordance with Subsection 102.12.

4. If the proposal does not contain a unit price for each pay item listed except in the case of alternate pay items.

102.06 Proposal Guaranty. No proposal will be considered unless accompanied by a guaranty of the character and in an amount not less than the amount indicated in the proposal form.

If a surety bond is used, it shall be submitted on an acceptable form signed by the bidder and the surety company. Power of Attorney for the person who executes the bond on behalf of the surety as Attorney-in-Fact must accompany the proposal bond.

If a government obligation is used in lieu of a proposal bond, it shall meet the conditions set out in Subsection 103.04 - Bond Requirements.

102.07 Delivery of Proposal. Each proposal should be submitted in the special envelope furnished by the state. The blank spaces on the envelope shall be filled in correctly to clearly indicate its contents. When an envelope other than the special one furnished by the state is used, it shall be of the same general size and shape and be similarly marked to clearly indicate its contents. When sent by mail, the sealed proposal shall be addressed to the state at the address and in care of the official in whose office the bids are to be received. All proposals shall be filed prior to the time and at the place specified in the Notice to Contractors. Proposals received after the time for opening of bids will be returned to the bidder unopened.

102.08 Withdrawal or Revision of Proposal. A bidder may withdraw or revise a proposal after it has been deposited with the state, provided the request for such

withdrawal or revision is received by the state, in writing or by telephone facsimile transfer, before the time set for opening proposals.

102.09 Public Opening of Proposals. Proposals will be opened and read publicly at the time and place indicated in the Notice to Contractors.

102.10 Disqualification of Bidders. Any of the following reasons may be considered as being sufficient for the disqualification of a bidder and the rejection of the bidder's proposal or proposals:

1. More than one proposal for the same work from an individual, firm, or corporation under the same or a different name.

2. Evidence of collusion among bidders. Participants in such collusion will receive no recognition as bidders for any future work of the state until any such participant shall have been reinstated as a qualified bidder.

102.11 Licensing of Bidders. Each bidder submitting a proposal for a contract which does not involve the expenditure of federal funds shall be licensed as set forth in Subsection 107.03 prior to submitting a bid. For contracts to be paid wholly or in part from federal funds, the successful bidder shall be licensed as set forth in Subsection 107.03 prior to awarding the contract.

102.12 Conditional Proposals. A bidder who desires to bid upon more than one project at a single letting, but who desires protection against receiving the award of more projects than the firm is equipped to handle, may bid upon any number of projects securing the protection desired by making the following written statement signed by the bidder and attached to the proposal for one or more of the projects bid on: "This proposal is conditioned upon my (or our) receiving the award for only one (or a greater number) of the contracts for which I (or we) have submitted proposals at this letting. If proposals for a greater number of contracts than herein before stated are accepted, then this proposal shall be considered withdrawn."

In case a bidder, who has conditioned proposals as above provided, is low bidder on more than one contract it shall be optional with the board as to which of the contracts shall be awarded to that bidder.

102.13 Protesting a Bid Proposal. Any bidder who wishes to protest a bid proposal, or the waiver of a bid irregularity of an apparent low bid, shall submit a protest in writing to the Chief Engineer within five (5) calendar days of the bid opening.

SECTION 103 - AWARD AND EXECUTION OF CONTRACT

103.01 Consideration of Proposals. After the proposals are opened and read, they will be compared on the basis of the summation of the products of the approximate quantities shown in the bid schedule by the unit bid prices. The results of such comparisons will be immediately available to the public.

The right is reserved to reject any or all proposals, to waive technicalities, to advertise for new proposals, or to proceed to do the work otherwise, if, in the judgment of the board, it is in the best interests of the state.

103.02 Award of Contract. The award of contract, if it is awarded, will be made within 45 calendar days after the Notice of Intent to Award letter has been mailed to the lowest qualified bidder whose proposal complies with all requirements prescribed.

However, the award may be deferred beyond 45 calendar days by mutual written agreement between the board and the lowest qualified bidder.

The period set forth above may be extended a reasonable time for the successful bidder to secure a license, provided application for license is filed with the Public Works Contractors State License Board not later than the first business day following receipt of the notification of the determination to award. Should award be precluded due to denial of bidder's application for license, or because the board determines it is not in the public interest to defer construction pending licensing, no forfeiture of proposal guaranty shall result. If application for license is not made on or before the first business day following notification, or if application is withdrawn, the proposal guaranty shall be forfeited the same as upon failure to execute a contract after award.

103.03 Return of Proposal Guaranty. Proposal guaranties, except those of the two lowest bidders, will be returned immediately following the opening and checking of the proposals. The retained proposal guaranty of the unsuccessful of the two lowest bidders will be returned within 10 days following the award of contract and that of the successful bidder will be returned after a satisfactory bond has been furnished and the contract has been executed. Surety proposal bonds will not be returned.

103.04 Bond Requirements. The lowest qualified bidder shall furnish a performance bond and a payment bond equal to the full amount of the contract, in accordance with the applicable Idaho law. The bonds and certificate shall be executed on the forms furnished by the state.

The lowest qualified bidder may deposit government obligations in lieu of performance and payment bonds under the following conditions:

1. The obligations shall be acceptable to the State Treasurer.

2. The obligations shall be payable to, or fully negotiable by, the Department.

3. The obligation shall be in an amount equal at fair market value to the penal sum of the required surety bonds.

4. The bidder pays the initial and return transfer charges for transmittal of the obligations to the Treasurer's office.

Within 45 days after final acceptance of the project, those obligations deposited as a performance bond will be returned, less any monies owed the Department as a result of this contract. Obligations deposited as the payment bond shall be held for a period of one year from the date of acceptance of the project for settlement of claims in accordance with Idaho Code, Section 54-1927.

Government obligations shall be deposited with the State Treasurer with instructions to issue a safekeeping receipt to the Idaho Transportation Department.

103.05 Execution and Approval of Contract. The contract shall be signed by the lowest qualified bidder and returned, together with the contract bonds, within 15 calendar days after the contract has been received by the bidder. When the contract includes provisions specifying participation goals by disadvantaged businesses, the above referenced contract documents shall be accompanied by Summaries of DBE Good Faith Efforts on forms provided by the Department along with other appropriate documents supporting the summaries as required. If the contract is not executed by the state within 15 calendar days following receipt from the bidder of the signed contracts and bonds, the bidder shall have the right to withdraw the bid without penalty. No contract shall be considered as effective until it has been fully executed by all of the parties thereto.

103.06 Failure to Execute Contract. Failure to execute the contract, file acceptable bonds and submit acceptable evidence, if required by contract, of good faith efforts to obtain participation by disadvantaged businesses within 15 calendar days after the contract has been received by the bidder shall be just cause for the cancellation of the award of contract and the forfeiture of the proposal guaranty which shall become the property of the state, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest responsible bidder or the work may be re-advertised and constructed under contract or otherwise, as the state may decide.

SECTION 104 - SCOPE OF WORK

104.01 Intent of Contract. The intent of the contract is to provide for the construction and completion in every detail of the work described. The Contractor shall furnish all labor, materials, equipment, tools, transportation and supplies required to complete the work in accordance with the plans, specifications and terms of the contract.

104.02 Variation in Quantities. The state reserves the right to make, at any time during the progress of the work, such increases and decreases in quantities of contract items as necessary to satisfactorily complete the project.

Such increases or decreases shall not invalidate the contract nor release the surety. The Contractor agrees to perform the work as altered.

Increases or decreases in the quantity of a contract item of work will be determined by comparing the total pay quantity of such item of work with the contract bid quantity. If the total pay quantity of any item of work varies from the bid quantity by 25 percent or less, payment will be made at contract unit prices unless eligible for adjustment pursuant to Subsection 104.03. If, however, the total pay quantity of an item of work varies from the bid quantity by more than 25 percent, an adjustment in price will be made to the contract upon written request of either party. The basis for the adjustment shall be agreed upon prior to the performance of the work. Such adjustment of the contract unit price will be the difference between the contract unit price and the actual unit cost to perform the work plus 6 percent profit. The adjustment to the unit cost will be made for work in excess of 125 percent, or less than 75 percent of the contract bid quantity on an agreed price basis. If no agreement on price can be reached, then the Engineer may establish a price considered to be fair and equitable or have the work done on a force account basis as provided under Subsection 109.03.

If the actual unit cost includes fixed costs, such costs will be deemed to have been recovered by the payments made for 125 percent of the bid quantity and in computing the actual unit cost, such costs will be excluded. Fixed costs may be considered when establishing adjustment in costs for items which decrease by more than 25 percent of the bid quantity. When the total pay quantity of an item of work is less than 75 percent of the contract bid quantity, payment for the work will in no case exceed the payment which would have been made for performance of 75 percent of the bid item quantity at contract unit price.

No allowance will be considered for anticipated profit when computing the adjusted price.

104.03 Changes and Extra Work.

1. The Engineer reserves the right to make, at any time during the work, such changes in quantities and such alterations in the work as are necessary to satisfactorily complete the project. Such changes in quantities and alterations shall not invalidate the contract nor release the surety, and the Contractor agrees to perform the work as altered. Alterations in the work includes new work which is not otherwise required by the terms of the contract.

   When the Department initiates a change, the Engineer will inform the Contractor of the proposed change in the work and will request a detailed price proposal for the change. The Contractor, at no expense to the Department and within the time specified in the request, shall provide the Engineer with a complete and itemized proposal for the change in work. The Contractor's proposal shall include the estimated increase or decrease in contract amount and/or increase or decrease in Contract Time. Request for contract time extensions shall meet the requirements of Subsection 108.06.

   Changes requested by the Contractor shall be presented to the Engineer on the "Request for Change" form supplied by the Department. The Contractor must give a detailed description of the proposed change, the reason for the change, the benefit to the Department, the benefit to the Contractor and a detailed cost analysis.

   The Contractor shall be responsible for any delays in work and any additional costs to the Department caused by failure to submit a complete price proposal within the time provided. The Contractor shall participate with the Department in prompt joint analysis and negotiations to finalize the Change Order.

Upon receipt of the Change Order, the Contractor shall have seven (7) calendar days to return the signed Change Order to the Engineer or return the Change Order unsigned. If the Change Order is returned unsigned, the Contractor shall provide a written explanation for not signing the Change Order. Payment for Change Order Work may be withheld until a signed Change Order or written refusal to sign the Change Order is received by the Engineer.

2. Any other order, written or an oral, (which terms as used in this paragraph 2 shall include direction, instruction, interpretation, or determination) from the Engineer, which causes any such change, shall be treated as a change order under this clause, provided that the Contractor gives the Engineer written notice within 7 calendar days of the order stating the date, circumstances, and source of the order and that the Contractor regards the order as a change order.

3. Except as herein provided, no order, statement, or conduct of the Engineer shall be treated as a change under this subsection or entitle the Contractor to an equitable adjustment hereunder.

4. Except for claims based on defective specifications no claim for any change under 2 above shall be allowed for any costs incurred more than 720 days before the Contractor gives written notice as therein required; and provided further, that in the case of defective specifications for which the Sstate is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with such defective specifications.

5. If the alterations or changes in quantities significantly change the character of the work under the contract, whether or not changed by any such different quantities or alterations, an adjustment, excluding loss of anticipated profits,will be made to the contract. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, then an adjustment will be made either for or against the Contractor in such amount as the Engineer may determine to be fair and equitable or on a force account basis as provided under Subsection 109.03.

6. If the alteration or changes in quantities do not significantly change the character of the work to be performed under the contract, the altered work will be paid for as provided elsewhere in the contract.

7. The term "significant changes" shall be construed to apply only to the following circumstances:

   a. When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction; or

   b. When a major item of work, as defined elsewhere in the contract, is increased in excess of 125 percent or decreased below 75 percent of the original contract quantity. Any allowance for an increase in quantity shall apply only to that portion in excess of 125 percent of original contract item quantity, or in case of a decrease below 75 percent, to the actual amount of work performed. Adjustments shall be in accordance with Subsection 104.02-Variations in Quantities.

8. If the Contractor intends to assert a claim for equitable adjustment under this subsection, the procedures in Subsection 105.17, Claims for Adjustment and Disputes, shall be followed.

9. When extra work is performed by an approved first and lower tier subcontractor, reimbursement to the Prime Contractor for administrative expenses will be in accordance with the following:

Agreed Price of First or Lower Tier Subcontractors Work

	Adjustment	Maximum
To	$1,000 . . . . . .(Lump Sum)	$100
Over	$1,000 to $10,000 . . . . . .($100 plus 5% of excess over $1,000)	$550
Over	$10,000 to $150,000 . . . .($550 plus 3% of excess over $10,000)	$4,750
Over	$150,000 . . . . . .(Lump Sum)	$5,000

Bid items with a price per unit in the original contract, which are included in the extra work, are not eligible for administrative expenses.

10. It is considered that overhead and profit are included in the agreed price, and no additional markups, above that provided for the prime Contractor's administrative expenses, will be allowed. No adjustment will be made on change order work for bonding, property damage and bodily injury insurance, or TERO tax until the end of the project. When the project work is complete and

satisfactory evidence is provided by the Contractor an adjustment will be made by change order to reconcile all bonding, insurance, and TERO tax issues.

104.04 Differing Site Conditions (Changed Conditions).

1. During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, are encountered at the site, the party discovering such conditions shall promptly notify the other party in writing of the specific differing conditions before they are disturbed and before the affected work is performed.

2. Upon written notification, the Engineer will investigate the conditions, and if it is determined that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the contract, an adjustment, excluding loss of anticipated profits, will be made and the contract modified in writing accordingly. The Engineer will notify the Contractor of the determination whether or not an adjustment of the contract is warranted.

3. No contract adjustment which results in a benefit to the Contractor will be allowed unless the Contractor has provided the required written notice.

4. The Contractor shall follow the procedures in Subsection 105.17, Claims for Adjustments and Disputes.

104.05 Maintenance of Traffic. Unless otherwise provided, the roadway, while undergoing improvements, shall be kept open to all traffic by the Contractor and traffic delays shall be minimized. In no case shall any individual traffic delay exceed 15 minutes. Remedial action shall be implemented if traffic delays reach 30 minutes or more cumulatively through the entire length of the improvement project. The Contractor must obtain written permission to exceed the stated maximum delay values.

A traffic control plan indicating the construction schedule, areas and type of work to be performed, shall be submitted by the Contractor and approved by the Engineer prior to starting work on the project, and prior to making any other changes to the traffic control.

The plan shall include any proposed detours and include all necessary traffic control devices and pavement markings. The plan shall also address proposed measures to promptly deal with traffic delays due to emergencies, highway incidents within the project limits, emergency vehicles, and scheduled school bus runs. A minimum of two calendar days notice shall be given before any change in the plan is made.

The Contractor shall provide an individual who is a certified Worksite Traffic Control Supervisor to direct the installation, modification, and maintenance of the required traffic control. The certification shall conform to the requirements of the American Traffic Safety Services Association (ATSSA) or an approved equal.

No separate payment will be allowed for monitoring traffic control during working hours and the cost thereof shall be incidental to other construction traffic control items.

The Contractor is responsible for monitoring and maintaining traffic control devices during non-working days and non-working hours. During non-working hours, an individual shall be available to perform maintenance of traffic control devices as necessary. Such individual need not be on duty, but shall be readily available by telephone contact. During non-working days, such individual shall review the Project traffic control at least once per day as authorized and perform any maintenance required. The Contractor shall provide a written statement of describing the time and activities undertaken during non-working days. Payment for monitoring will be paid as Traffic Control Maintenance when authorized during non-working hours and non-working days.

Where provided on the plans or otherwise approved, the Contractor may bypass traffic over an approved detour route. The periods of time when traffic will be routed over any detour, instead of through the project, construction shall be as directed. Selective detouring of traffic shall be approved in writing. The maintenance of any detour shall include abatement of dust nuisance by the application of water or dust oil as directed. Payment will be made as provided under Subsection 205.05 or as Extra Work if no contract item has been provided.

The Contractor's maintenance of areas used by traffic shall be such that the roadway and structures are kept passable to all vehicles at all times. The Contractor shall also provide and maintain in a safe condition, temporary approaches or crossings and intersections with trails, roads, streets, businesses, parking lots, residences, garages and farms. For the purpose of this subsection, maintenance shall not include snow removal. The Contractor shall bear all expense of maintaining traffic over the section

of road undergoing improvement and of constructing and maintaining such approaches, crossings, intersections, diversions and other features as may be necessary, without direct compensation, except as provided below:

1. *Maintenance of Traffic During Winter Suspension of Work*. Prior to winter suspension of the work, the Contractor shall construct to an acceptable width and condition such portions of the roadway as necessary to safely accommodate traffic during the anticipated suspension as approved by the Engineer. The grading shall be completed sufficiently to provide acceptable drainage and a safe, smooth driving surface adequate for use by snow removal equipment. Thereafter, until issuance of an order for resumption of construction operations, the maintenance of the temporary route or line of travel will be by and at the expense of the Department, unless specified in the contract for maintenance to be done by the Contractor with work to be reimbursed as provided in Section 631 - Construction Maintenance During Winter Suspension. When work is resumed, the Contractor shall replace or renew any work or material lost or damaged because of such temporary use of the project; shall remove to the extent directed any work or materials used in the temporary maintenance; and shall complete the project in every respect as though its prosecution had been continuous and without interference. Restoration work to the traveled portion of the roadway and temporary roadways caused by such suspension will be paid for by the state at contract prices or as extra work.

2. *Temporary Detours.* In lieu of maintaining traffic through the improvement, the Contractor may, when authorized, bypass traffic over detours constructed and maintained at no additional expense to the State. Accumulative payment for traffic control items, flagging and pilot cars for use on an approved temporary detour shall not exceed the estimated cost of these items for maintaining traffic through the project.

104.06 Maintenance of Public Haul Roads. On projects involving the hauling of material and equipment over public highways and streets, the Contractor shall maintain and restore such highways and streets to a condition equally as good as they were in when hauling was started. No separate payment will be made for such maintenance or restoration.

Dust nuisance due to the Contractor's hauling operations on public highways, streets and special detours shall be abated in a satisfactory manner by the application of

water or dust oil as directed. Payment will be made as provided under Subsection 205.05205.17, or as Extra Work if no contract item has been provided.

104.07 Rights in and Use of Materials Found on the Work. The Contractor, with approval, may use on the project such stone, gravel, sand, or other material determined to be suitable, as may be found in the excavation and will be paid for the excavation of such materials at the corresponding contract unit price and for the pay item for which the excavated material is used. The Contractor shall replace all of that portion of the excavation material so removed with other acceptable material at no cost to the State. No charge for the materials so used will be made against the Contractor. The Contractor shall not excavate or remove any material from within the highway location which is not within the grading limits, as indicated by the slope and grade lines, without written authorization.

104.08 Final Cleaning Up. Before final acceptance of the highway, materials sources, excluding established commercial sites, and all areas occupied by the Contractor in connection with the work shall be cleaned of all rubbish and waste, excess material, temporary structures and equipment. All of the work shall be left in an acceptable condition.

104.09 Increases or Decreases Due to Taxes.

1. Except as may be otherwise provided in this contract, the contract price includes all applicable federal, state and local taxes and duties.

2. Nevertheless, with respect to any federal or state excise tax or duty on the transactions or property covered by this contract, if a statute, court decision, written ruling, or regulation takes effect after the contract date and could not have been anticipated prior to contract date; and

    a. Results in the Contractor being required to pay or bear the burden of any such federal or state excise tax or duty or increase in the rate thereof which would not otherwise have been payable on such transactions or property, the contract price shall be increased by the amount of such tax or duty or rate increase; provided that the Contractor if requested by the Engineer, warrants in writing that no amount for such newly imposed federal or state excise tax or duty or rate increase was included in the contract price as a contingency reserve or otherwise; or

b. Results in the Contractor not being required to pay or bear the burden of, or in obtaining a refund or drawback of, any such federal or state excise tax or duty which would otherwise have been payable on such transactions or property or which was the basis of an increase in the contract price, the contract price shall be decreased by the amount of the relief, refund, or drawback, and that amount shall be paid to the state, as directed by the Engineer. The contract price shall be similarly decreased if the Contractor, through fault or negligence or failure to follow instructions of the Engineer, is required to pay or bear the burden of, or does not obtain a refund or drawback of, any such federal or state excise tax or duty.

3. No adjustment pursuant to paragraph 2 above will be made under this contract unless the aggregate amount thereof is or may reasonably be expected to be over $100.

4. As used in paragraph 2 above, the term “contract date” means the date set for the bid opening. As to additional supplies or services procured by modification to this contract, the term “contract date” means the date of such modification.

5. The Contractor shall promptly notify the Engineer of matters which will result in either an increase or decrease in the contract price, and shall take action with respect thereto as directed by the Engineer.

SECTION 105 - CONTROL OF WORK

105.01 Authority of the Engineer and Suspension of Work. The Engineer will decide all questions which may arise as to the quality and acceptability of materials furnished and work performed and as to the rate of progress of the work; all questions which may arise as to the interpretation of the plans and specifications; and all questions as to the acceptable fulfillment of the contract on the part of the Contractor.

Suspension of Work.

1. The Engineer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as he may determine to be appropriate for the convenience of the state. In cases of suspension, work shall not be resumed until permitted by written order from the Engineer, which will stipulate the date when contract time shall again be charged.

2. If the performance of all or any portion of the work is suspended or delayed by the Engineer for an unreasonable period of time (not originally anticipated, customary, or inherent to the construction industry) and the Contractor believes that additional compensation and/or contract time is due as a result of such suspension or delay, the Contractor shall submit to the Engineer in writing a request for adjustment within seven calendar days of receipt of the notice to resume work. The request shall set forth the reasons and support for such adjustment.

3. Upon receipt, the Engineer will evaluate the Contractor's request. If the Engineer agrees that the cost and/or time required for the performance of the contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the Engineer will make adjustment as provided in Subsection - 109.03(4c) - Standby Rate (excluding profit) and modify the contract in writing accordingly. The Engineer will notify the Contractor of the determination whether or not an adjustment of the contract is warranted.

4. No contract adjustment will be allowed unless the Contractor has submitted the request for adjustment within the time prescribed.

5. No contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided for or excluded under any other term or condition of this contract.

105.02 Plans and Working Drawings. Plans show details of all structures, lines, grades, typical cross sections of the roadway, location and design of all structures and a summary of items appearing on the proposal. The Contractor shall keep one set of plans available on the work at all times.

The Contractor will supplement the plans by such working drawings as are necessary to adequately control the work. Working drawings shall be submitted to the Engineer for review in advance of the start of the affected work to allow time for review by the Engineer and corrections by the Contractor without delaying the work. The drawings shall be on sheets measuring 22 in. x 34 in. (559 mm x 864 mm). Unless otherwise stated in the contract, the Engineer will require up to 30 calendar days from the date the submittals or re-submittals are received until they are returned to the Contractor.

This time will increase if the drawings submitted do not meet the contract requirements or contain sufficient details.

For structures, six sets of working drawings shall be furnished and shall include stress sheets, shop drawings, erection plans, coffer dam plans, bending diagrams for reinforcing steel, or any other supplementary plans or similar data required of the Contractor.

Working drawings shall be approved before beginning the work covered by these drawings. Such approval is only for general conformance with the information given in the contract documents and does not relieve the Contractor of responsibility for correctness of the details and dimensions, nor does it waive any requirements of the specifications.

The contract price shall include the cost of furnishing all working drawings.

105.03 Conformity with Plans and Specifications. All work performed and all materials furnished shall be in reasonably close conformity with the lines, grades, cross sections, dimensions and material requirements, including tolerances, shown on the plans or indicated in the specifications.

In the event the Engineer finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications but that reasonably acceptable work has been produced, the Engineer will make a determination if the work shall be accepted and remain in place. Should the work be accepted, the Engineer will document the basis of acceptance and provide for an appropriate adjustment in the contract price for such work or material as deemed necessary to conform to a determination based on engineering judgment.

In the event the Engineer finds the materials furnished, work performed, or the finished product not in reasonably close conformity with the plans and specifications and have resulted in an inferior or unsatisfactory product, the work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor.

105.04 Coordination of Plans, Specifications, Supplemental Specifications, and Special Provisions. These specifications, the supplemental specifications, the plans, special provisions, and all supplementary documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all.

They are intended to be complementary and to describe and provide for a complete work. In the case of discrepancy, calculated dimensions will govern over scaled dimensions; plans will govern over standard specifications, supplemental specifications, and standard drawings; supplemental specifications will govern over standard specifications; special provisions will govern over standard specifications, supplemental specifications, and plans. If there is any conflict in requirements between the general notes and the details on the plans, the requirements of the details on the plans shall prevail.

The Contractor shall take no advantage of any apparent error or omission in the plans or specifications. In the event the Contractor discovers such an error or omission, the Engineer shall be immediately notified. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.

105.05 Administrative Cooperation. The Contractor will be supplied with 10 sets of plans and proposals.

The Contractor shall give the work the constant attention necessary to facilitate the progress thereof, and shall cooperate with the Engineer, inspectors, and other Contractors in every way possible.

The Contractor shall have on the work at all times, as an agent, a competent superintendent capable of reading and thoroughly understanding the plans and specifications and thoroughly experienced in the type of work being performed, who shall receive instructions from the Engineer or other authorized representatives. The superintendent shall have full authority to execute orders or directions of the Engineer without delay, and to promptly supply such materials, equipment, tools, labor, and incidentals as may be required. Such superintendence shall be furnished regardless of the amount of work sublet.

105.06 Cooperation Between Contractors. The state reserves the right at any time to contract for and perform other or additional work on or near the work covered by the contract.

When separate contracts are let within the limits of any one project, each Contractor shall perform so as not to interfere with or hinder the progress or completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with their contract and shall protect and save harmless the state from any and all damages or claims that may arise because of inconvenience, delay, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange the work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project. The Contractor shall join the work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

105.07 Utility Facilities. The plans, showing approximate location of utility facilities either above or below ground, or special provisions will indicate those utility facilities known to require removal, relocation or adjustment for construction of the project. The Contractor shall field verify utility locations prior to construction. No separate payment will be made for locating or verifying utility facility locations.

The Contractor shall coordinate project operations, including subcontractors, with the owners of utilities identified on the plans and special provisions, and owners of any unidentified utilities found during construction. The Contractor's coordination of project operations shall include:

1. Coordinating when, and providing sufficient time in the schedule, as required for each utility owner to perform their work.
2. Sufficient prior notification of when utilities need to schedule and perform their work, as required by each utility owner.
3. Notification of the utility owners, in accordance with Title 55, Chapter 22, Idaho Code.

The Contractor shall cooperate and conduct operations in such a manner as to avoid any unnecessary delays or hindrances to utility work being performed by utility owners or their authorized agents. No separate payment will be made for any inconvenience of the Contractor for working around utility facilities that are to be and in the process of being removed, relocated or adjusted. The Contractor shall bear all expenses for any utility removal, relocation or adjustment made solely for the Contractor's benefit, to facilitate construction operations that would not otherwise be required.

If a utility facility is encountered and is not shown on the plans or mentioned in the special provisions as requiring relocation or adjustment, but must be relocated or

adjusted to permit prosecution of the work, the Contractor shall immediately notify the Engineer so arrangements to relocate or adjust the utility facility can be made with the utility owner. This work will be performed either by others at no cost to the Contractor, or shall be performed by the Contractor and will be paid for as extra work as provided in Subsection 104.03.

If delays occur because of the Contractor's failure to communicate, coordinate and schedule with the utility owners as specified herein, the delays will be considered avoidable and no time extensions or compensation will be allowed.

If performance of the Contractor's work is delayed as the result of the failure of the utility facility to remove, relocate or adjust utility facilities within the specified times, a time adjustment will be granted in accordance with Subsection 108.06, if it can be shown that the construction work was actually delayed by the utility difficulty, and the Contractor did everything required by this subsection and the contract to minimize the delay.

If, as a result of utility facilities not being removed, relocated or adjusted as provided above and the Contractor determines that a loss will occur that cannot be avoided, the Engineer shall be immediately notified in writing of the situation and the location and circumstances concerning the loss so that the Engineer may observe the situation and make any records necessary to confirm the loss.

If the Engineer determines the Contractor has sustained a loss which could not have been avoided by the judicious handling of forces, equipment and plant, an adjustment, excluding loss of anticipated profit, will be made to the contract.

Any claim of the Contractor for adjustment under this subsection shall meet the requirements of Subsection 105.17, Claims for Adjustments and Disputes.

In accordance with the provisions of Subsection 107.12, the contractor shall be liable to the owners of utility facilities for any damage or interference with service resulting from the Contractor's operations.

105.08 Construction Stakes, Lines and Grades. The Engineer will set construction stakes to establish lines, slopes and continuous grade for road work. Roadway centerline and bench marks will be set for bridge work. Structure centerline and bench marks will be set for culverts and other structures. All additional information relating to lines, slopes and grades, will be furnished to the Contractor to

allow establishment of all other necessary controls required to perform the work. No additional stakes or marks will be provided by the Engineer.

The state will spot check the lines and elevations established by the Contractor. These spot checks will not change the requirements for normal checking and testing as described elsewhere and do not relieve the Contractor of the responsibility of producing a finished product that is in accordance with the plans, standard specifications and Special Provisions of the contract. Any costs involved in correcting surveying errors committed by the Contractor, or any work resulting from such errors, shall be borne solely by the Contractor.

The Contractor will be held responsible for the preservation of all construction stakes and benchmarks. Any stakes or benchmarks that are carelessly or willfully destroyed or disturbed by the Contractor will be replaced and the cost charged to the Contractor.

The state will be responsible for the accuracy of its engineering work except as qualified above.

105.09 Authority and Duties of Resident Engineer. As the representative of the administrator and under the direction of the District Engineer, the Resident Engineer has immediate charge of the engineering details of the project. The Resident Engineer is responsible for administering the terms of the contract, laying out the work, measuring the work and maintaining appropriate records.

105.10 Duties of the Inspector. Inspectors employed by the state will be authorized to inspect all work done and materials furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. The inspector is not authorized to alter or waive the provisions of these specifications. The inspector is not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor. The inspector has the authority to reject work or material until any question at issue can be referred to and decided by the Engineer.

105.11 Inspection of Work. All materials and each part or detail of the work shall be subject to inspection by the Engineer. The Engineer shall be provided access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection. Any such inspection and associated testing is for the sole benefit of the state and shall not

relieve the Contractor of the responsibility of providing quality control measures to assure the work strictly complies with the contract requirements.

The Engineer may direct the Contractor to remove or uncover portions of the finished work. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering or removing, and the replacing of the covering or making good of the parts removed, will be at the Contractor's expense.

When any unit of government or political subdivision or any utility is to pay a portion of the cost of the work covered by this contract, its respective representatives shall have the right to inspect the work. Such inspection shall in no sense make any unit of government or political subdivision or utility a party to this contract, and shall in no way interfere with the rights of either party hereunder.

105.12 Removal of Unsatisfactory and Unauthorized Work. Except as otherwise provided in Subsection 105.03, unsatisfactory work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause, found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner at the Contractor's expense.

Work done contrary to instructions of the Engineer, work done beyond the lines shown on the plans, or as given, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any written order made under the provisions of the subsection, the Engineer will have the authority to cause unacceptable work to be remedied, or removed and replaced, and unauthorized work to be removed, and to deduct the costs from any monies due or to become due the Contractor.

105.13 Load Regulations. The Contractor shall comply with all legal load regulations in the hauling of materials on public roads beyond the limits of the project. The operation of equipment of such weights or so loaded as to cause damage to structures or the roadway or to any other type of construction will not be permitted. In

no case shall legal load limits be exceeded over structures, subbase, base, and pavement, unless permitted in writing.

The Contractor shall be responsible for all damage caused by the Contractor's hauling equipment.

105.14 Maintenance During Construction. The Contractor shall maintain the work during construction and until the work is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces to the end that the roadway, or structures, are kept in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

Cost of maintenance work during construction shall be included in the unit prices bid on the various pay items and the Contractor will not be paid an additional amount for such work.

105.15 Failure to Maintain Roadway or Structures. If the Contractor, at any time, fails to comply with the provisions of Subsection 105.14, the Engineer will immediately notify the Contractor of such noncompliance in writing. If the Contractor fails to remedy unsatisfactory maintenance after receipt of such notice, the Engineer may immediately proceed to maintain the project, and the cost of this maintenance will be deducted from monies due or to become due the Contractor on the contract.

105.16 Acceptance.

1. *Partial Acceptance.* If at any time during the prosecution of the contract the Contractor substantially completes a portion of the project, such as a structure, an interchange, or a secttion of road, the Contractor may request in writing that the Engineer make final inspection of that portion. If the Engineer finds upon inspection that the portion has been satisfactorily completed in compliance with the contract, the Engineer may accept in writing that portion as being completed and the Contractor may be relieved of further responsibility for that portion. Such partial acceptance will in no way void or alter any of the terms of the contract.

2. *Final Acceptance.* Upon written notice from the Contractor of completion of the entire contract, the Engineer will make an inspection and if all construction provided for and contemplated by the contract is found to be satisfactorily completed, that inspection shall constitute the final inspection and the Engineer will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of the final inspection. If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same, and the Contractor shall immediately comply with and execute such instruction. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the Engineer will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

105.17 Claims for Adjustment and Disputes

ALTERNATE DISPUTE RESOLUTION PROVISIONS

Alternate dispute resolution provisions are provided for under Subsection 105.18, Claim Review Board (CRB) Specifications. In addition, a Dispute Review Board (DRB) is provided for on selected projects or may be adopted by change order. Use of an alternate dispute resolution provision does not relieve the Contractor or Department from complying with all contract terms and conditions, and does not waive any notice or timeliness requirements per Subsection 105.17. However, if an alternate dispute resolution provision is adopted and used, the claim submittal time frames and the review time frames of Subsection 105.17 may be revised by mutual written agreement of the Contractor and the Department, or if they are unable to agree, shall be established by the Department.

ADMINISTRATIVE PROCESS

RESIDENT ENGINEER. When disputes and disagreements arising out of or relating to the Contract or any work performed pursuant to the Contract, including additional work required in a Change Order or written or oral order or direction, instruction, interpretation, or determination by the Resident Engineer occur, the Contractor shall immediately give a signed written notice of intent to file a construction claim to the Resident Engineer. If such notification is not given and the Resident Engineer is not afforded the opportunity by the Contractor to examine the site of work or is kept from keeping a strict account of actual costs incurred to perform the disputed work or is not afforded the opportunity to review the Contractor's project records, then the Contractor shall waive all his rights to pursue the claim under the contract.

Unrelated claim issues will be processed as separate claims and therefore must be submitted as separate claims.

The Contractor shall supplement the written notice of claim within 15 calendar days of filing the notice of intent to file a construction claim with a written statement providing the following:

1. The date of the claim.
2. The nature and circumstances which caused the claim.
3. The contract provisions that support the claim.
4. The estimated dollar cost, if any, of the claim and how that estimate was determined.
5. An analysis of the schedule showing any schedule change, disruption, and any adjustment of contract time.

If the claim is continuing, the Contractor shall supplement the information required above in a timely manner.

The Contractor shall provide to the Resident Engineer full and final documentation to support the claim no later than 6030 calendar days following the date the claim has fully matured. A claim fully matures when all the direct damages (money and/or time) resulting from the claim issue can be reasonably quantified. Impact damages may be submitted later as separate claims if and when they occur. The possibility of impact damages should not delay the submittal of full and final documentation of claims with direct damages.

The full documentation of the claim, as presented in the administrative process shall, at a minimum, contain the following elements.

1. A detailed factual narration of events that details the nature and circumstances which caused the claim. This detailed narration of events shall include, but is not limited to, providing all necessary dates, locations, and items of work affected by the claim.

2. The specific provisions of the contract or laws which support the claim and a statement of the reasons why such provisions support the claim.

3. The identification and copies of all documentsany of the Contractor's documents and the substance of any oral communication that support the claim. Manuals that are standard to the industry may be included by reference.

4. If an adjustment of time for the performance of the contract is sought:

    a. The specific days and dates for which it is sought.

    b. The specific reasons the Contractor believes a time adjustment should be granted.

    c. The specific provisions of the Contract under which additional time is sought.

    d. The Contractor's detailed analysis of their schedule to demonstrate the justification for a time adjustment.

5. If additional monetary compensation is sought, the exact amount sought and a breakdown of that amount into the following categories:

    a. Labor. Listing of individuals, classification, hours worked, etc.

    b. Materials. Invoices, purchase orders, etc.

    c. Equipment. Listing detailed description (make, model, and serial number), hours of use and dates of use. Equipment rates shall be at the applicable Blue Book Rate, which was in effect when the work was performed, as defined in Subsection 109.03.

    d. Job Site Overhead.

    e. Home Office Overhead (General and Administrative).

    f. Other categories as specified by the Contractor or the Department.

6. The above data shall be accompanied by a notarized statement from the Contractor containing the following certification:

Under penalty of law for perjury or falsification, the undersigned,

_____
(Name)

_____
(Title)

_____
(Company)

hereby certifies that the claim is made in good faith; that the supporting data are accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the contract adjustment for which the Contractor believes the Idaho Transportation Department is liable; and that I am duly authorized to certify the claim on behalf of the Contractor.

_____
(Dated)

Subscribed and sworn before me this _____ day of _____, 20_____.

Notary Seal

My commission expires: _____

All pertinent information, references, arguments and data to support the claim shall be included.

By failing to follow the claim procedures previously described, including time frames and content of claim submittals, the Contractor waives his right to pursue the claim under the contract.

Throughout any disputed work, the Contractor shall keep complete records of extra costs and time incurred. The Contractor shall provide copies of these records to the Resident Engineer as they accrue (daily if necessary) so they may be reviewed and field verified while the disputed work is taking place.

Provided the claim is complete and fully documented when it is received, the Resident Engineer will render a decision as follows:

> Within 60 calendar days from the date the Resident Engineer receives the claim if the claim amount is less than $100,000.
>
> Within 90 calendar days from the date the Resident Engineer receives the claim if the claim is greater than $100,000.

If the claim submittal is found to be incomplete, the Contractor will be notified to provide the additional information that is required. When this occurs the Resident Engineer's review time will be adjusted as deemed appropriate and the Contractor will be notified.

If the Resident Engineer determines a claim has entitlement, an adjustment will be made when warranted.

In spite of any claim, the Contractor shall proceed with the performance of the contract and in accordance with the Resident Engineer's direction.

Failure of the Resident Engineer to provide a written decision within the time provided above shall be deemed denial of the claim and the Contractor may appeal within 30 calendar days.

CHIEF ENGINEER. The Resident Engineer's decision will be final and conclusive unless, within 30 calendar days from receipt of the Resident Engineer's decision, the Contractor appeals in writing to the Chief Engineer upon which receipt shall be acknowledged in writing. The Contractor's appeal shall include a copy of the Contractor's complete and fully documented claim.

The Chief Engineer will issue a written decision to the contractor within 90 calendar days from the date the Chief Engineer receives the claim appeal.

The Chief Engineer's decision will be final and conclusive unless subsequently changed by a court of competent jurisdiction or by binding arbitration.

GENERAL

In connection with any appeal proceeding under this subsection, the Contractor will be afforded an opportunity to be heard in support of their claim at any level of review.

At any stage of the Administrative process, if the above review time restraints are unreasonable due to the complexity of the claim under consideration, either party will notify the other and mutual consent will be required to extend the times set forth for decision at any level.

AUDITS

The Contractor's wage, payroll, and cost records pertaining to the claim shall be open to inspection and/or audit by representatives of the Department. The Contractor shall retain these records on their premises. Cost records of all subcontractors and all lower tier subcontractors shall be retained and open to similar inspection and/or audit. The inspection and/or audit may be performed by employees of the Department or by an independent auditor under contract with the Department. The Contractor, subcontractors, or lower tier subcontractors shall provide adequate facilities, acceptable to the Department and its auditors for the inspection and/or audit process during normal business hours. The Contractor, subcontractors, and lower tier subcontractors shall make a good faith effort to cooperate with the auditors. The Contractor will be provided with reasonable notice before the first day the audit is scheduled to commence. All cost records shall be retained until the claim is resolved. Information obtained in such audits shall be maintained by the Department to the extent provided by law as confidential information.

Failure of the Contractor, subcontractors, or lower tier subcontractors to maintain and retain sufficient records to allow the auditors to verify all or a portion of the claim or to permit the auditor access to the books, ledgers or any other records of the Contractor, subcontractors, or lower tier subcontractors shall constitute a waiver of that portion of the claim.

At a minimum, the auditors shall have available to them the following documents pertaining to the claim:

1. All daily time sheets and supervisors' daily reports.
2. All union agreements.
3. All insurance, welfare, and benefits records.
4. All payroll registers.
5. All earnings statements and records.
6. All payroll tax statements and records.
7. All materials records, invoices and requisitions.
8. All materials cost distribution sheets.
9. All equipment records.
10. All vendors, rental agencies, subcontractor's and lower tier subcontractor's invoices.
11. All subcontractor's and lower tier subcontractor's payment certificates.
12. All canceled checks for both payroll and vendors.
13. All job cost reports.
14. All job payroll ledgers.
15. All general ledgers.
16. All cash disbursement journals.
17. All financial statements for all years reflecting the operations on this contract. In addition, the Department may require, if deemed appropriate, additional financial statements for (3) years preceding execution of the contract and three years following final acceptance of the project.
18. All documents which relate to each and every construction claim for this project together with all documents which support the amount of damages as to each claim for this project.
19. Worksheets, accounting spreadsheets or any other documents used to prepare the elements of the construction claim including but not limited to labor, benefits and insurance, materials, equipment, subcontractors, all documents which establish the time periods, individuals involved, the hours for the individuals, and the rates for all the individuals.
20. All documents and computation sheets used during the course of bidding to the extent the claim is based upon the original bid.
21. All scheduling documentation.

BINDING ARBITRATION

The Contractor shall exhaust the Administrative Process for resolution, unless the Contractor and the Department agree that claims that have not been resolved through the Administrative Process provided in this section shall be resolved through binding arbitration. The Contractor and the Department may agree on an arbitration process, or, if the Contractor and the Department cannot agree, arbitration shall be administered through the American Arbitration Association (AAA) using the following arbitration methods:

1. The current version of the Expedited Procedures of the Construction Industry Arbitration Rules shall be used for claims with an amount equal to or less than $250,000.

2. The current version of the Standard Procedures of the Construction Industry Arbitration Rules shall be used for claims with an amount greater than $250,000.

The Department and Contractor agree that any arbitration hearing shall be conducted in Boise, Idaho.

The Contractor and the Department agree to be bound by the decision of the binding arbitration, and the judgment rendered by the arbitrator(s). The decision of the arbitrator(s) and the specific basis for the decision shall be in writing. The arbitrator(s) shall use the contract as a basis for the decision.

Unless the Contractor and the Department agree, all unresolved claims and disputes, which arise from the contract, must be brought in a single arbitration hearing.

The Contractor shall in all subcontracts and contracts with suppliers include a provision that the subcontractor/supplier shall be bound by and limited to the procedures outlined in Subsection 105.17 Claims for Adjustments and Disputes. All subcontractor and supplier claims must be made by the Contractor.

If the Contractor is to make a demand for arbitration, it must be made within 120 days of the date of the Chief Engineer's decision, otherwise the Chief Engineer's decision shall be final and conclusive.

105.18 CLAIM REVIEW BOARD SPECIFICATIONS (STATEWIDE STANDING BOARD)

GENERAL

Definitions

CRB – See Claim Review Board.

Contract – The construction contract.

Claim – A construction claim that has been properly filed according to the contract.

Claim Review Board – A board of three neutral individuals selected by the Department in cooperation with representatives of the Idaho highway construction industry.

Summary

One or more CRB's will be established to assist in the review of Claims in connection with, or arising out of, performance of the work of the Contract. The CRB will be available to hear Claims arising from all construction contracts statewide.

The CRB will be available for Claims that have been appealed to the Chief Engineer level of review per Subsection 105.17 of the Standard Specifications. CRB review will not be available for Claims on those projects where a DRB was established to review disputes.

A claim will be referred to the CRB when requested by either the Contractor or the Department and agree to by both.

Utilization of the CRB does not relieve the Contractor or the Department from complying with all Contract terms and conditions, and does not waive any notice or timeliness requirements per Subsection 105.17. However, if a Claim is referred to the CRB, the Claim submittal time frames and the review time frames of Subsection 105.17 may be revised by mutual written agreement of the Contractor and the Department or if they are unable to agree, shall be established by the Department.

The CRB will promptly and impartially consider the Claim or Claims referred to it. The CRB will provide non-binding written findings and recommendations of its Claim review to the Contractor and the Department.

Although the findings and recommendations of the CRB should carry great weight for both the Contractor and the Department, they are not binding on either the Contractor or the Department. However, the findings and recommendations will be admissible in subsequent Claim resolution. (See "Admissibility" section herein.)

Scope

This specification describes the purpose, procedure, function, and features of the CRB. A Three-Party Agreement among the Department, Contractor, and the CRB members will formalize the involvement of the CRB, and establish the scope of its review and the rights and responsibilities of the Contractor and the Department. In the event of a conflict between the Specification and the Three-Party Agreement, the latter governs. A suggested format for the Three-Party Agreement is attached as Appendix A.

Purpose

The purpose of the CRB is to provide an independent and impartial review of the Claim, and provide non-binding written findings and recommendations based on the contract, applicable contract law, industry practices, and the facts presented.

It is not the purpose, or responsibility, of the CRB to resolve the Claim. However, it is anticipated that the CRB review will assist the Contractor and the Department in resolving the Claim.

Creation of the CRB is not intended as a substitute for Department or Contractor responsibility to make a good-faith effort to settle the Claim. Indiscriminate referral of claims to the CRB without prior attempts by the Contractor and the Department to resolve them shall be avoided.

Continuance of Work

Both the Contractor and the Department shall proceed diligently with the work and comply with all applicable contract provisions while the CRB considers a Claim.

Tenure of CRB

The CRB's involvement in any Claim commences when the Department, the Contractor, and the members of the CRB have executed the Three-Party Agreement (Appendix A).

The CRB's involvement in each specific Claim will end as of the date the CRB submits its written findings and recommendations unless subsequent services, such as clarification, are required.

MEMBERSHIP

General

The CRB will consist of three members selected jointly by the Department and the Idaho highway construction industry. Alternate members will also be selected who can serve on the CRB panel in the event of a conflict of interest or other disqualification of one or more of the members in a particular case. One member will be selected by the CRB members to serve as Chairperson.

The members will serve three (3) year rotating terms with one member rotating off the CRB each year. The terms of the initial appointees to the CRB will be for one year for one member, two years for the second member, and three years for the third member as designated by the letter of appointment. Thereafter, the terms of all subsequent appointments or reappointments shall be for terms of three years. All alternate members will serve three-year terms.

A one-member CRB can be convened to review a Claim or Claims on a particular project by the agreement of the Contractor and the Department and if the total amount claimed is less than one hundred thousand dollars ($100,000). Both the Contractor and the Department shall agree to the selection of one member of the CRB panel to serve as the one-member CRB in such cases.

Criteria

Experience

It is desirable that all CRB members and alternates be experienced with the construction process including design, construction, contract administration, contract law, industry practices and resolution of construction claims.

It is not necessary that the CRB members be intimately familiar with the specific type of construction involved in the Claim. The CRB may consult technical experts under the provisions of Section 105.19 if the need arises.

All members of the panel shall have attended the one day DRB panel member workshop offered by the Dispute Review Board Foundation, or its substantial equivalent in other training, or shall be a qualified DRB panel member in another state which has training as a prerequisite to qualification for service on DRB panels.

Neutrality

It is imperative that the CRB members be neutral, act impartially, and be free of any conflict of interest.

For purposes of this subparagraph, the term “members” also includes the member’s current primary or full-time employer, and “‘involved” means having a contractual relationship with either the Contractor or the Department, or with another involved entity such as a subcontractor, architect, engineer, or construction manager.

Prohibitions, disqualifying relationships for CRB members in general:

Any substantial financial interest involved in current ITD construction projects that suggests partiality;

Any close professional or personal relationship with key employees of the Department, the State, or key representatives of the Idaho highway construction industry that suggests partiality;

Any past history with the Department, State, or representatives of the Idaho highway construction industry that suggests partiality.

Prohibitions, disqualifying relationships for CRB members regarding the Claim and construction contract at issue:

An ownership interest in any entity involved in the construction contract, or a financial interest in the contract, except for payment for services on this CRB; Previous employment by, or financial ties to, any party involved in the construction contract within a period of one (1) year prior to award of the contract, except for fee-based consulting services on other projects;

A close professional or personal relationship with any key member of any entity involved in the construction contract which, in the judgment of either the Contractor or the Department, suggests partiality; or

Prior involvement in the construction contract of a nature that could compromise that member's ability to participate impartially in the CRB's activities;

Discussion concerning, or the making of, an agreement with any entity involved in the construction contract regarding employment after the Claim review is completed;

Any of the provisions of (1) through (5) above may be waived by mutual written agreement of Contractor and the Department.

Disclosure Statement

Prior to service on each individual Claim review, all CRB members will be required to submit complete disclosure statements for the approval of both the Contractor and the Department. Each statement shall include a declaration describing all past, present, and anticipated or planned future relationships, including indirect relationships through the prospective member's primary or full-time employer, to this project and with all parties involved in the Contract, including subcontractors, suppliers, design professionals, and consultants. Disclosure of close professional or personal relations with all key members of all parties to the Contract shall be included.

Selection Process

The Department, in consultation with representatives of the Idaho highway construction industry, will appoint three members and five alternate members to serve on the CRB. Typical candidates to serve in these positions will be retired or semi-retired, and experienced engineers, contractors, claim consultants, and construction attorneys.

The initial CRB will be formed in the following manner. The Department and the members of the Idaho AGC Highway Construction Committee (Contractor Representative) will jointly create a roster of interested potential members and alternates for appointment to the CRB. The roster will contain the names of no less than twelve individuals and include resumes of the persons named. Once the roster is created, the Contractor and the Department Representative will each nominate, in

writing, four individuals from the roster. Both the Contractor and the Department will confirm the availability and willingness of their nominees to serve on the CRB as a member or alternate. The Contractor and the Department Representative will then each select one of the four individuals nominated by the other party to serve on the CRB and notify the other party of its selection. The Contractor or the Department will then meet to randomly select (draw a name out of a hat) the remaining CRB member from the remaining nominees. The remaining nominees not selected by this process to serve on the CRB will be appointed to serve as alternate members of the CRB. If additional alternate members are needed, they will be selected using a similar selection process as agreed to by the Contractor and the Department Representative.

The members of the CRB will select the Chairperson of the CRB.

If more than one CRB is to be established or if replacements are required for a CRB, such members will be randomly selected from among the alternate members previously selected using the process set forth above. Selection of replacement for the alternate members will be made using a similar selection process to that set forth above, or another process that is mutually agreeable to the Contractor and the Department Representative.

The appointment of any member of the CRB may be terminated by mutual agreement of the Contractor and the Department Representative at any time upon joint written notice to the member whose appointment is to be terminated and the other CRB members. Either the Contractor or the Department may remove any CRB member from the CRB at any time in a particular case by providing notice thereof to the member to be removed, the other party and the remaining members of the CRB, and stating the reasons for the decision to remove the member.

Three-Party Agreement

Upon the agreement of the Contractor and the Department to submit a claim to the CRB, all three CRB members and the authorized representatives of the Contractor and the Department shall execute a CRB Three-Party Agreement (see Appendix A) for each claim referred to it.

OPERATION

General

In general, the CRB will operate in accordance with this Specification. However, it is not desirable to adopt hard-and-fast rules for the functioning of the CRB. The entire procedure shall be kept flexible to adapt to changing situations. The CRB shall establish, with the concurrence of the Department and the representatives of the Idaho highway construction industry that selected the CRB, new written procedures on modifications to such procedures whenever this is deemed appropriate. Additionally, the Contractor and the Department involved in each claim brought before the Board may agree in writing with the CRB on modifications or alterations to the procedures to be followed in the review of that particular Claim.

Periodic Meetings and Visits

The CRB will not typically visit the project site or meet with the Contractor and the Departments during the construction of the project. However, the CRB may visit the project site if they deem it advantageous or necessary. Representatives of both the Contractor and the Department shall accompany the CRB on the site visit. Meeting may be held by conference call, videoconference or any other means approved by the Contractor and the Department to minimize the time and expense involved in the process.

REVIEW OF CLAIMS

General

The Contractor and the Department will cooperate to ensure that the CRB considers Claims promptly, taking into consideration the particular circumstances and the time required to prepare appropriate documentation.

Procedures and time periods may be modified by mutual written agreement.

Prerequisites to Review

A Claim may be referred to the CRB when:

It has been properly appealed to the Chief Engineer per the terms of the Contract, and

It has not previously had the opportunity to be reviewed by a DRB, unless the Contractor and the Department specifically waive this limitation in writing, advising the CRB of the reasons for the waiver.

Requesting Review

Either the Contractor or the Department may request that a Claim be referred to the CRB for review. The Request for Review shall be submitted in writing to the other party within 20 calendar days of the Claim appeal to the Chief Engineer. Both the Contractor and the Department must agree to refer a Claim to the CRB.

The Request for Review shall state clearly and in full detail the specific issues of the Claim to be considered by the CRB, and include an estimate as to when the requesting party would be ready to submit its final position statement and Claim documentation to the CRB and the other party.

If the Contractor and the Department mutually agree to submit the Claim to a CRB, the Department will promptly submit the Request for Review to the CRB Chairperson.

After conferring with both the Contractor and the Department, the CRB Chairperson will establish a submittal schedule for the submission by both parties of the documentation in the Claim Record (see below), and for the submission of the parties' position statements so that adequate time is allowed for the submissions before the presentation.

Creation of the Claim Record for Review

The Contractor will provide to each CRB member a complete copy of the Claim submittal, which shall be the same as the Claim submittal that was provided to the Department with the appeal to the Chief Engineer.

The Department will provide to each CRB member a set of plans and specifications and a copy of the Resident Engineer's Claim analysis and decision. The Department will also provide the CRB members and the Contractor a copy of the Chief Engineer's preliminary analysis of the claim(s) if any has been prepared.

The materials and documentation provided to the CRB by the parties under this section shall be considered the Claim Record for the CRB's review of the claim.

Scheduling Review

The Three-Party Agreement will empower the CRB to schedule the presentations.

Upon receipt of a Request for Review, the Chairperson will schedule a presentation date.

Pre-presentation Requirements

Concise written position statements shall be prepared by both the Contractor and the Department, with page number references to the claim record, and submitted to each CRB member and to the other party.

No documents, materials, reports, analysis or other information of any type shall be referenced in the position statement or considered by the CRB in its review unless the same is contained in the Claim Record.

The Contractor shall submit its position statement first, followed by the Department in accordance with the schedule established by the Chairman of the CRB.

Presentation

Unless otherwise agreed by the Department, the Contractor, and the CRB, the presentation will be conducted at the offices of the Department Headquarters in Boise. Private sessions of the CRB may be held at any convenient location.

The Contractor and the Department shall have representatives in attendance at all presentations. The Contractor will present its position first, followed by the Department. Each party will be allowed successive rebuttals until all aspects are fully covered. The CRB members and the Contractor and the Department may ask questions, request clarification, or ask for additional data. In difficult or complex cases, additional dates for presentations may be necessary in order to facilitate full consideration and understanding of all the evidence presented by both parties. Both the Contractor and the Department shall be provided adequate opportunity to present their evidence, documentation, and testimony regarding all issues before the CRB.

No documents, materials, reports, analysis or other information of any type shall be referenced in the presentations or considered by the CRB in its review unless the same is contained in the Claim Record.

Unless otherwise agreed in writing by the Contractor and the Department, the position statements, presentations and reviews will relate to the issue(s) of entitlement only. When the Contractor and the Department agree in writing that the CRB will review or give guidance on issues of quantum as well as entitlement, both the Contractor and the Department will complete the presentations on entitlement before quantum is presented.

Normally, a formal transcript of the presentations will not be prepared. When requested by either the Contractor or the Department, the CRB may allow recordation and transcription by a court reporter with the cost to be allocated as agreed by the Contractor and the Department. Such transcript, when prepared, will not constitute the official record of the CRB Review. The record prepared by the CRB shall be the official record of the CRB Review. The CRB may provide for audio or video recordings of the presentations for CRB use only.

Attorneys will be allowed to attend the presentations, and will be allowed to make brief opening and closing remarks and advise their clients. No other participation by attorneys at the presentations will be permitted.

If either the Contractor or the Department fails to appear before the CRB on the date scheduled for the presentations without justifiable cause, the party that is in attendance shall prevail in their position on the Claim.

Deliberations

After the presentation is concluded, the CRB will confer to formulate its findings and recommendations. All CRB deliberations shall be conducted in private, with all individual views kept strictly confidential from disclosure to anyone other than the members of the CRB.

Findings and Recommendations

The findings and recommendations of the CRB concerning any Claim are non-binding but admissible (see Admissibility section below).

It is not the responsibility of the CRB to resolve the Claim. That responsibility remains with the Contractor and the Department. The findings and recommendations of the CRB shall be based upon the Contract, applicable contract law, industry practices

and the facts. The CRB must also evaluate whether the burden of proof has been met.

The CRB's findings and recommendations will be provided in writing to both the Contractor and the Department, by certified mail return receipt requested, within 30 days of the completion of the presentations. The CRB should set forth, as clearly as possible, the logic and reasoning behind its findings and recommendations. The findings and recommendations will address entitlement only, unless it is mutually agreed that the CRB will be asked to review or give guidance on issue(s) of quantum as well as entitlement. In difficult or complex cases, and in consideration of the CRB's schedule, this time may be extended by mutual agreement of the CRB, Contractor and the Department.

If the CRB has been requested by the Contractor and the Department to review issues of quantum, and the exact value of the quantum cannot be determined expeditiously by the CRB, then quantum may be addressed in the CRB's analysis and findings and recommendations by providing guidelines to be used to determine the quantum. The Contractor and Department will then subsequently make the final determination of quantum. If there is still disagreement between the Contractor and the Department, then this disagreement may then be submitted back to the CRB for final analysis and findings.

If the CRB is unable to reach unanimity in its findings and recommendations, the Contractor and the Department will be advised of that fact in the report of the CRB. A dissenting member, in his/her discretion, may prepare a minority report to be included in the CRB report.

Acceptance or Rejection

Within 7 calendar days of the date of the CRB's findings and recommendations, both the Contractor and the Department will provide, by certified mail return receipt requested, written notice to the other and to the CRB of acceptance or rejection of the CRB's findings and recommendations. If, with the aid of the CRB's findings and recommendations, the Contractor and the Department are able to resolve their Claim, the Department will promptly process any required Contract changes.

If either the Contractor or the Department rejects the findings and recommendations of the CRB, the Claim will continue under the administrative process of Subsection 105.17. Subsequent Claim submittal time frames and review time frames may be

revised by mutual written agreement of the Contractor and the Department or if they are unable to agree, shall be established by the Department.

Clarification and Reconsideration

Should the Claim remain unresolved because of a bona fide lack of understanding of the findings and recommendations, either the Contractor or the Department may, within the 7 calendar day period following the date of the CRB's findings and recommendations, request in writing by certified mail return receipt requested, that the CRB clarify specified portions of its findings and recommendations.

Admissibility

If the CRB's findings and recommendations do not resolve the Claim, the Contract, the written analysis and findings and recommendations, including any minority report, and the qualifications of the CRB members will be admissible as evidence to the extent permitted by law in any subsequent Claim resolution proceeding or forum to establish (a) that a CRB considered the Claim (b) the qualifications of the CRB members, and (c) the CRB's findings and recommendations that resulted from the process.

Legal Relations

Each CRB member in the performance of his or her duties on the CRB, is acting in the capacity of an independent agent and not as an employee of either the Contractor or the Department.

Each CRB member is acting in a capacity intended to facilitate resolution of Claims. Accordingly, the Contractor and the Department will agree that to the fullest extent permitted by law, each CRB member shall be accorded quasi-judicial immunity for any actions or decisions associated with the review and findings and recommendations for Claims referred to the CRB. No CRB member may be called as a witness by either the Contractor or the Department in subsequent proceedings on the Claim. Other than the findings and recommendations of the CRB, all records, proceedings and deliberations of the CRB are to be kept confidential to the fullest extent permitted by law. The CRB shall, upon completion of the project, turn all records of the CRB over to the Department for storage and preservation in accordance with Department policy and state law.

Each CRB member shall by agreement be held harmless for any personal or professional liability arising from or related to CRB activities. To the fullest extent permitted by law, the Contractor and the Department will indemnify all CRB members for claims, losses, costs, and damages (including reasonable attorney's fees) for bodily injury, property damage, or economic loss arising out of or related to the CRB members carrying out CRB functions. This indemnity is a joint and several obligation of the Contractor and the Department.

PAYMENT

The Contractor and the Department shall bear the costs and expenses of the CRB equally. Preauthorized Time spent On-Site, at Hearings, at Meetings, or Reviewing the Dispute away from the Project Site – Each CRB member will be compensated for actual time spent at the rate of $125 per hour with a maximum of $1,000 per day. This rate shall include all normal incidental expenses such as telephone, fax, postage, courier, printing, and computer services. The CRB activity must be preauthorized by both the Contractor and the Department.

Travel Time to and from Preauthorized Meetings – Each CRB member will be compensated for actual travel time to and from CRB meetings at the rate of $50 per hour with a maximum of $200 each way.

Travel Expenses – Travel expenses will be reimbursed at standard state of Idaho rates for transportation, lodging, and meals for each day, or portion thereof, that the CRB member is traveling to or from, or attending, an authorized CRB activity.

The Department will provide, at no cost to the Contractor, administrative services such as conference facilities and secretarial services for the CRB.

These special provisions and the Three Party Agreement contain all of the provisions for compensation and expenses of the CRB. All CRB members shall be compensated at the same daily and hourly rate.

The Contractor shall pay the invoices of all Board members after approval by both the Contractor and the Department. The Contractor will then bill the Department for one-half of such invoices. The Department will then promptly make payment to the Contractor.

There will be no markups applied to expenses connected with the CRB, either by the CRB members or by the Contractor when requesting payment of the Department's share of CRB expenses. Regardless of the CRB recommendation, neither the Department nor the Contractor shall be entitled to reimbursement of CRB costs from the other party.

If the CRB desires special services such as legal, technical or other expert assistance or testimony, or other consultation, accounting, data research, and the like, both the Contractor and the Department must agree to provide the special services, and the procedures in Subsection 105.19 for technical expert assistance will be followed.

The cost records and accounts pertaining to this Agreement shall be kept available for inspection by representatives of the Department or Contractor for 5 years after final payment.

APPENDIX A
CLAIM REVIEW BOARD THREE-PARTY AGREEMENT

(To be executed after appeal to Chief Engineer upon agreement of the parties)

I. Parties

A. Department
B. Contractor
C. Claim Review Board (CRB) Members:
   1.
   2.
   3.

II. Situation

The Contractor and Department are now or have been engaged in the construction of the _____
(project name).

The Contract provides for the submission of Claims which have been appealed to the Chief Engineer, to a Claim Review Board ("CRB") to assist in resolving Claims as defined therein.

III. Purpose

The purpose of the CRB is to provide an independent and impartial review of the appealed Claim and non-binding written findings and recommendations based on the Contract, applicable contract law, industry practices and the facts presented. It is not the purpose, or responsibility, of the CRB to resolve the Claim. That responsibility remains with the Contractor and the Department. However, it is anticipated that the CRB's review and findings and recommendations will assist in the resolution of this matter.

IV. Scope of Work

The scope of work of the CRB includes, but is not limited to, the following:

Project Site Visits

The CRB will not typically visit the project site or meet with the Contractor and the Department during the construction of the project. However, the CRB may visit the project site if they deem it advantageous or necessary.

Establish Procedures

Operating procedures will be in accordance with the Claim Review Board Specifications which are attached and incorporated herein by this reference and any modifications thereto contained in this Agreement.

Findings and Recommendations

Upon receipt by the CRB of a written Request for Review of a Claim, signed by both the Contractor and the Department, the CRB shall set a date for presentations to review and consider the Claim, and thereafter issue written findings and recommendations to the Contractor and the Department.

It is expressly understood that all CRB members are to act impartially and independently in the consideration of facts and conditions surrounding any claim. Prior to or during the presentation, no CRB member shall express any opinion concerning the merits of any facet of the case.

Other

It is the express continuing responsibility of each member of the CRB to notify the Contractor and the Department and disclose immediately any and all existing or potential conflicts of interest, and/or inappropriate contact with either the Contractor or Department that may exist or develop during the term of this Agreement.

Except for providing the services required in the Agreement, the CRB and its individual members shall refrain from giving any advice to either the Contractor or the Department concerning conduct of the work or the resolution of problems which might compromise the integrity of the CRB.

Contractor Responsibilities

Except for its participation in the CRB's activities as provided in the Contract and in this Agreement, the Contractor shall not solicit advice or consultation from the CRB or its members on matters dealing with the conduct of the work or resolution of problems which might compromise the integrity of the CRB.

The Contractor shall furnish each CRB member and the Department with Contractor-prepared documents, to supplement the documents provided by the Department.

Department Responsibilities

Except for its participation in the CRB's activities as provided in the Contract and in this Agreement, the Department shall not solicit advice or consultation from the CRB or its members on matters dealing with the conduct of the work or resolution of problems which might compromise the integrity of the CRB.

The Department shall:

Furnish each CRB member with a copy of the conformed Contract documents, including but not limited to the specifications, plans, and pertinent change orders.

In cooperation with the Contractor, coordinate the operations of the CRB.

Furnish conference facilities and provide secretarial and copying services.

Time for Beginning and Completion

The CRB shall begin review of a specific Claim following execution of this Agreement, and shall terminate its activities upon issuance of its written findings and recommendations, unless the Contractor and the Department request subsequent services in writing.

Payment

Payment to the CRB member(s) for their service hereunder shall be made in accordance with the "PAYMENT" section of the CRB Specification.

Termination of Agreement

This Agreement may be terminated by mutual agreement of the Contractor and the Department at any time upon written notice to the members of the CRB.

CRB members may withdraw from the CRB by providing 28 calendar days written notice to the parties. Any CRB member may be removed from the panel reviewing a particular case by either the Contractor or the Department at any time by providing notice thereof to the other party and the remaining members of the CRB, and stating the reasons for the decision to remove a member.

Should the need arise to appoint a replacement member to the CRB on a particular claim, the replacement member shall be randomly selected from among the qualified alternate members of the CRB. The selection of a replacement CRB member shall begin promptly upon notification of the necessity and shall be completed within 14 calendar days. This Agreement will be amended to indicate changes in CRB membership.

Legal Relations

Each CRB member, in the performance of his or her duties on the CRB, is acting in the capacity of an independent agent and not as an employee of either the Contractor or the Department.

Each CRB member is acting in a capacity intended to facilitate resolution of Claims. Accordingly, the Contractor and the Department will agree that to the fullest extent permitted by law, each CRB member shall be accorded quasi-judicial

immunity for any actions or decisions associated with the review and findings and recommendations of Claims referred to the CRB. No CRB member may be called as a witness by either the Contractor or the Department in subsequent proceedings on the Claim. Other than the findings and recommendations of the CRB, all records, proceedings and deliberations of the CRB are to be kept confidential to the fullest extent permitted by law. The CRB shall, upon completion of the project, turn all records of the CRB over to the Department for storage and preservation in accordance with Department policy and state law.

Each CRB member shall be held harmless by the Contractor and the Department from any personal or professional liability arising from or related to CRB activities. To the fullest extent permitted by law, the Contractor and Department shall indemnify all CRB members for claims, losses, demands, costs, and damages (including reasonable attorney's fees) for bodily injury, property damage, or economic loss arising out of or related to CRB members carrying out CRB functions. The foregoing indemnity is a joint and several obligation of the Contractor and the Department.

The obligations and responsibilities of the CRB members under this Agreement shall not be assignable.

Disputes Regarding This Three-Party Agreement

Disputes among the parties arising out of this Agreement which cannot be resolved by negotiation and mutual concurrence among the parties, and actions to enforce any right or obligation under this Agreement shall be initiated in the Fourth Judicial District Court in Ada County, Idaho.

All questions shall be resolved by application of Idaho state law.

The Department, the Contractor and the CRB members hereby consent to the personal jurisdiction of the Fourth Judicial District Court in Ada County, Idaho.

Funding Agency Review

The funding agencies for the project on which the Claim arises have the right to review the CRB findings and recommendations and to attend CRB meetings and presentations, but not to participate in or attend private CRB deliberations.

Effective Date

This Agreement is effective as of _____.

CRB Member	CRB Member	CRB Member
_____	_____	_____
_____	_____	_____
date date	date	

Contractor	Department
By: _____	By: _____
Title:_____	Title:_____
Date: _____	Date:_____

105.19 Technical Analysis Support (TAS) Specification

In the event that a significant impasse arises between the Contractor and the Department during the course of a project that the parties are unable to resolve through consultation and negotiation between them, the parties may, by mutual agreement, retain the services of a technical expert (TE) to provide technical analysis support (TAS) for the project. Such impasses may be technical in nature, may involve scheduling conflicts, interpretation of contract documents, pricing of additional work, or other significant issues. If a three party agreement for a Dispute Review Board (DRB) or Claim Review Board (CRB) has been established for the project, the DRB or CRB may, with the agreement of the parties request the retention of a technical expert to assist the DRB or CRB in performing its function of dispute or claim review.

The TE selected should be neutral and impartial, should have technical expertise in the area of the impasse, and is to be objective and represent the interests of the project. The parties will, by separate agreement, define the scope of the duties of the TE and the budget for such services on a case-by-case basis. The parties will share the costs and expenses of the TAS process equally. The parties will handle billing and payment for such services in the same manner as is provided in the contract for payment of CRB services.

The findings and recommendations of the TE are not binding upon the parties. However, if the TE's findings and recommendations do not resolve the impasse, the findings and recommendations will be admissible as evidence to the extent permitted by law in any subsequent dispute or claim resolution proceeding or forum to establish (a) that an independent TE considered the issue, (b) the qualifications of the TE, and (c) the TE's findings and recommendations that resulted from the process.

The process for selection of a TE and the provision of technical support is as follows:

1. The parties agree that there is an impasse between them on a significant issue that will benefit from the analysis of a neutral, qualified technical expert.
2. The parties select the expert. Effort should be made to find a firm or professional who is held in high regard for the professional expertise. The parties should interview them jointly.
3. The parties agree in writing upon the scope of the analysis to be performed, the budget for the analysis, report needs, support needs, and documentation needed as well as the deadline for the findings and recommendations of the expert.
4. The parties agree in writing upon terms for the selected expert to represent the interests of the project, not the parties. The expert that is chosen will agree to remain neutral. Neither party may retain the services of the neutral expert to represent them in subsequent issues or disputes on this project.
5. Upon execution of the agreement, the expert will be given a directive to proceed with the analysis of the issue(s).
6. The TE's findings and recommendations will be delivered jointly to the parties, and a discussion will be held between the parties and the TE to clarify the findings and the basis for the findings and recommendations.
7. Each party will make an individual choice to accept or reject the findings and recommendations of the TE, and notify the other party in writing of its decision within 48 hours of that decision. If the parties agree to follow the findings and recommendation of the TE, such change orders as are required or appropriate in the circumstance will be prepared and agreed to by all parties. If the parties do not agree to follow the findings and recommendations of the TE, the Department will direct the contractor to proceed in the manner determined by the Department under the terms of the contract.

105.20 Value Engineering Change Proposals (VECP):

The Contractor may submit proposals to the Engineer for modifying the plans, specifications, or other requirements of the contract for the sole purpose of reducing the total costs of construction without impairing in any manner the essential functions or characteristics of the project.

Any cost savings generated to the contract as a result of VECP offered by the contractor and approved by the Department will be shared equally between the contractor and the Engineer. The Contractor's costs for development, design and implementation of the VECP are not eligible for reimbursement. The Department's estimated costs for evaluation, review and implementation of the VECP will NOT be included in the calculation of net savings. Payment for a VECP will be made through the change order process as outlined in Subsection 104.03, and will be considered as full and adequate consideration for performance of the work of the change order.

The Contractor shall not base any bid prices on the anticipated approval of a VECP.

The Engineer shall be the sole judge of the acceptability of a VECP and of the estimated net savings in construction costs from the adoption of all or any part of such proposal. In determining the estimated net savings, the right is reserved to disregard the contract bid prices if, in the judgment of the Engineer, such prices do not represent a fair measure of the value of work to be performed or to be deleted. The Department will bear no liability for any delay in considering a VECP, the refusal to accept or approve such a proposal, or any other matter connected with a VECP.

VECPs that change the following will not be considered:

(a) Basic design of a bridge and its components or other elevated structure or facility.

(b) Type, size, elevation or structural requirements of footings or other types of foundations.

(c) The types, thickness, or joint designs of a concrete, bituminous, or stabilized surface or base course.

(d) Environmental mitigation commitments for the project.

(A) Submittal and Review of VECP Concept or Idea**:**

(1) The contractor shall initially submit a brief letter with preliminary plans, specifications and costs to the Engineer to illustrate the concept or idea. The contractor shall indicate whether adequate time is available in their schedule for formal submittal and review prior to VECP implementation. The savings generated by the VECP must be sufficient to warrant a review and processing of the VECP.

(2) The Department will review the concept or idea, within ten calendar days of the contractor's initial submittal and inform the contractor in writing whether the concept should be submitted as a formal VECP.

(3) The Department may choose to evaluate the need for a time extension to the contract. Its evaluation will be based on the additional time needed by the Engineer for review and the effect on the contractor's schedule occasioned by the added time.

(B) Formal Submittal of the VECP:

Final proposals will be considered only after approval of the initial proposal in accordance with Subheading (A) above. Within 30 calendar days after the Department has determined the VECP concept or idea has merit, the contractor shall submit a formal proposal. The proposal shall include:

(1) A statement that the final proposal is submitted as a Value Engineering Change Proposal.

(2) A description of the difference between the existing contract and the proposed change and the advantages and disadvantages of each, including effects on service life, economy of operations, ease of maintenance, benefits to the traveling public, desired appearance, and safety.

(3) A complete set of plans and specifications showing the proposed revisions relative to the original contract features and requirements supported by design computations as necessary for a thorough and expeditious evaluation.

(4) A complete cost analysis indicating the original estimated costs and quantities which are proposed to be replaced compared to the new costs and quantities generated by the VECP.

(5) A time schedule or date, within which the change order must be issued to obtain the maximum cost reduction during the remainder of the contract and the reason for this schedule.

(6) A statement detailing the effect the proposal would have on the time for completing the project. A revised CPM Schedule shall be submitted that details changes to the construction schedule as a result of the VECP.

(7) A description of the conditions and results of any previous use or testing of the VECP on a previous project. If the proposal was previously submitted, the date, Contract Number, and the action taken by the Department shall be provided.

(C) Conditions:

Value Engineering Change Proposals will be considered only when all of the following conditions are met:

(1) A VECP submitted by the Contractor applies only to the ongoing contract referenced in the proposal and becomes the property of the Department. The Department will have the right to use, duplicate and disclose any data necessary for the utilization of the proposal on this or other projects without obligation to the Contractor unless the Contractor identifies certain parts of the proposal as restricted use. This provision is intended to protect trade secrets, bidding and pricing methods, and rights provided by law with respect to patented designs, materials, or processes.

(2) The contractor shall have no claim for additional costs or delays resulting from the rejection of a VECP, including development costs, loss of anticipated profits, increased material or labor costs resulting from delays in the review of such proposal.

(3) A saving resulting solely from the elimination or reduction in quantity of a single bid item will not be considered as a VECP. A saving resulting from

the elimination or reduction in quantity of a bid item specified as part of a VECP will be considered.

(4) Contingency items such as traffic control and dust control may be considered when they are reduced as part of a VECP to change scope, method or procedure, provided they are specified as individual contract bid items.

(5) The Contractor shall ensure a Professional Engineer licensed to practice in the State of Idaho seals the VECP, as required by Idaho Code.

(D) Acceptance, Rejection and Payment:

Within 30 calendar days of the contractor's complete formal submission of the VECP, the Department will accept or reject the VECP.

(1) The change order shall provide that the contractor be paid 50 percent of the net savings amount as reflected by the difference between the cost of the revised work and the cost of the related construction required by the original contract computed at contract bid prices, or fair market value as determined by the Engineer.

(2) The Contractor's costs for development, design and implementation of the VECP are not eligible for reimbursement. The Department's estimated cost to evaluate, review and implement the VECP will NOT be included in the calculation of net savings.

(3) The incentive payment will be calculated as follows:

$$S = \frac{A - B}{2}$$

S = Share in quantifiable cost savings from the VECP.

A = Cost of the original contract bid items which are to be deleted, or the fair market value as determined by the Engineer.

B = Cost of the contract items which are to be added.

SECTION 106 - CONTROL OF MATERIAL

106.01 Source of Supply and Quality Requirements. Only those materials produced under acceptable quality control practices and meeting the requirements of applicable specifications shall be used. All materials shall be new unless otherwise specified. In order to expedite the inspection and testing of materials, the Contractor shall notify the Engineer of proposed sources of materials prior to manufacture, fabrication and delivery. At the option of the Engineer, materials may be inspected and approved at the source of supply before delivery is started. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish acceptable materials from other sources.

At the option of the Contractor and with approval, the substitution of like materials of equal or better quality may be made. Materials from the Department's qualified products list shall be used as specified and in accordance with any indicated conditional requirements. Materials used from the qualified products list that do not meet the conditional requirements, if any, shall be rejected and replaced at no additional cost.

Better quality considerations are material properties, compatibility with environmental conditions, aesthetics and suitability for the purpose intended. Proof of equal or better quality must be furnished by the Contractor.

Methods of installing or applying materials will be in accordance with the manufacturer's recommendations, unless otherwise specified. If the plans or specifications conflict with current manufacturer's recommendations for product usage or installation the Contractor shall immediately notify the Engineer in writing.

106.02 Materials Order Approval. Unless otherwise permitted, the Contractor shall obtain the Engineer's approval of quantities to be purchased before ordering piling, pipe, pipe culvert, guardrail, pipe siphon, or sign posts.

106.03 Samples, Tests, Cited Specifications. All materials shall be accepted before being incorporated into the work, based on inspection and test results, except that certain material which cannot be routinely sampled prior to delivery may be incorporated with approval, at the Contractor's risk.

Unless otherwise designated, sampling and testing will be done by and at the expense of the State. Copies of test results will be furnished to the Contractor's representative upon request.

When testing is designated as the Contractor's responsibility, any associated sampling shall be included, unless stated otherwise. No separate payment will be made for such sampling and testing. Test results shall be furnished to the Engineer. The Engineer shall have access to the Contractor's testing facilities at all times.

A safe means of sampling shall be provided by the Contractor.

Testing and sampling shall be in accordance with the current edition of the test methods prescribed in the contract. Quality assurance will be in accordance with the Department's Quality Assurance Program as contained in the ITD Quality Assurance Manual.

All individuals that sample and test materials for ITD construction projects shall be WAQTC (Western Alliance for Quality Transportation Construction) qualified for all tests they perform and the testing laboratory used to perform the tests shall be qualified.

106.04 Certification of Materials. Certain materials may be accepted on the basis of the manufacturer's or fabricator's certification in a form acceptable to the Engineer signed by a person in responsible charge that the material was manufactured in accordance with and meets specification requirements. The manufacturer's certification will not preclude the sampling and testing of the material, or its final acceptance or rejection on the basis of the test results.

For materials indicated to be accepted by certification, the certificates and any required backup documentation such as mill reports shall be furnished with each shipment delivered to the work; and the type and quantity of certified material in the shipment must be clearly identified in the documentation.

106.05 Plant Inspection. The Engineer may undertake the inspection of materials at the source. Manufacturing plants may be inspected periodically for compliance with specified manufacturing methods, and material samples will be obtained for laboratory testing for compliance with materials quality requirements. This may be the basis for acceptance of manufactured lots as to quality. In the event source or plant inspection is undertaken the following conditions shall be met:

1. The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom materials have been contracted.

2. The Engineer shall have full entry at all times to such parts of the plant as may concern the manufacture or production of the materials being furnished.

3. Adequate safety measures shall be provided and maintained.

It is understood that the Engineer reserves the right to inspect or retest all materials which have been inspected or tested and approved at the source of supply or fabrication site after the same have been delivered and reject all materials, which, when inspected or re-tested, do not meet the requirements of the contract. Approval of material at the source of supply or fabricating site is based on spot checking procedures and must be considered as qualified presumptive judgment of conformance with specifications. In addition it is recognized that material may be damaged in transit to the site of the work. Therefore, final approval and acceptance of material will be based upon its in-place condition on the project.

106.06 Storage of Materials. Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate inspection. Materials stored along the roadside shall be located 30 ft. (9 m) or more from the edge of traveled way unless otherwise approved by the Engineer. If the area has a posted regulatory speed limit of 40 mph (65 km/hr) or less, the distance may be reduced to 10 ft. (3 m), if approved. Approved portions of the right-of-way and materials sources may be used for storage purposes and for the placing of the Contractor's plant. Private property shall not be used for storage purposes without written permission of the owner or lessee, and if requested by the Engineer, copies of such written permission shall be furnished. Compliance with Subsection 107.18 - Cultural Resource will apply.

106.07 Handling Materials. All materials shall be handled in such manner as to preserve their quality and fitness for the work.

Provisions must be made to prevent intermingling of different stockpiled materials. This includes sufficient space to ensure clear separation between piles or use of adequate bulkheads between piles.

106.08 Field Laboratory. When testing is designated to be the responsibility of the State, a field laboratory will be provided by the State. When testing is designated

to be the responsibility of the Contractor, the Contractor shall provide the field laboratory. Field Laboratories shall be qualified.

When the State furnishes a field laboratory, the Contractor shall provide the items and services as listed in the remainder of this subsection.

The Contractor shall provide a 50 ampere, 125/250 volt, single phase, four-wire, 60-cycle A. C. electrical service to the outlet of the field laboratory or field office unless otherwise directed. The service outlet or power supply cord assembly shall not be modified in any way. All cost to complete the installation shall be borne by the Contractor.

The state will provide a service pole for the electrical hook-up. The service pole is normally stored at the District Headquarters yard. The Contractor shall transport, install, connect, disconnect, remove and return the pole to the yard. Any damage to the service pole and/or its appurtenances shall be repaired by a licensed electrical contractor at the Contractor's expense. The Contractor shall check the service pole in and out through the District Materials Section.

The state-furnished service pole is equipped with a feeder assembly compatible with the requirements of the current National Electrical Code. This assembly is rated for 50 ampere mobile home service, as specified in Subsection 550-5 (N.E.C.), and configured as shown in Figure 550-5(c) (N.E.C.). This assembly shall not be modified or removed from the service pole for any reason. Connection to this assembly shall be by the wires extending from the weatherhead only.

Should the Contractor choose to provide a service pole, it shall be equipped with a feeder assembly compatible with the requirements of the current National Electrical Code. This assembly shall be rated for 50 ampere mobile home service, as specified in Subsection 550-5 (N.E.C.), and configured as shown in Figure 550-5(c) (N.E.C.).

The service shall be connected by a licensed electrical contractor. The electrical contractor shall file for an electrical inspection permit with the Idaho Department of Labor and Industrial Services. Permits shall be obtained at the Contractor's expense. The field laboratory shall not be connected to the service pole until the hook-up has been approved by the Electrical Inspector.

The electrical service shall be grounded using a copper-clad grounding rod no less than 8 ft. (2.5 m) in length and no less than 1/2 in. (13 mm) in diameter.

A parking area for the field laboratory or field offices shall be provided unless otherwise directed. The parking area shall be approximately 15 ft. (5 m) wide and 35 ft. (10 m) long, leveled across its length and width, cleared of vegetation and debris, and sloped to drain.

106.09 Material Sources. Materials sources are divided into two groups: Designated Sources and Contractor Furnished Sources. Designated Sources are those listed in the contract documents by number and location.

1. *Designated Sources.* Sources of local materials may be designated on the plans and described in the special provisions. The quality of material in such deposits will be acceptable in general, but the Contractor shall determine the amount of equipment and work required to produce a material meeting the specifications. It shall be understood that it is not feasible to ascertain from samples the limits for an entire deposit, and that variations shall be considered as usual and are to be expected. The Engineer may order procurement of material from any portion of a deposit and may reject portions of the deposit as unacceptable. Unless otherwise noted, the removal of material from below water will not be required.

   The state may acquire and make available to the Contractor the right to take materials from the sources designated on the plans and described under special provisions, together with the right to use such property as may be specified, for plant site, stockpiles and hauling roads.

   Royalty payments for material removed from designated sources shall be deducted from progress estimates and will be paid to the named owner by the State.

   For contracts which involve removal of material from sources not owned by the state or federal government, the Contractor shall furnish the State a letter of release in triplicate from the owner. The release shall certify that the source has been left in a presentable condition with all debris resulting from Contractor's operations removed and disposed of, and the requirements of the special provisions have been met. A source release will not be required from commercial sources.

2. *Contractor Furnished Sources.* Contractor furnished sources shall include all sources other than designated sources. Department controlled sources other

than those designated in the contract will be included as contractor furnished sources if authorized for use.

Written approval is required prior to use of material from contractor furnished sources. The Contractor shall make all requests for use of material from contractor furnished sources in writing to the Engineer.

The Contractor may be allowed to use Department controlled sources as contractor furnished sources. A list of Idaho Transportation Department controlled sources is available from the Engineer. The Contractor is encouraged to look at the information available pertaining to the source(s) of interest to determine suitability for the project requirements. Approval of such contractor furnished sources may include stipulations controlling the final condition and appearance of the sources.

If the Contractor's written request for use of a Department controlled source is approved, the Engineer will determine the terms and conditions of use and will prepare an agreement for the Contractor's signature within 14 calendar days of approving the request. Access to Department controlled sources will not be permitted until an executed agreement is returned to the Engineer.

As part of the Contractor Furnished Source Approval process, the contractor shall include a reclamation plan approved by the Idaho Department of Lands. Roadside sources may not be approved if they are considered to create an unsightly appearance even though the quality of material is satisfactory and the reclamation plan has Idaho Department of Land's approval. The Contractor shall comply with all phases of the approved reclamation plan prior to final payment.

Prior to beginning any work within any Contractor furnished sources, the Contractor shall comply with Subsection 107.18.

The Contractor shall acquire all the necessary rights, including but not limited to access and conditional use permits, to obtain materials from the sources and shall pay all related costs. All costs of exploring, developing, and testing for source approval and use of Contractor Furnished Sources shall be borne by the Contractor. The use of material from Contractor Furnished Sources will not be permitted until sampling and test results indicate the material meets quality requirements for each aggregate product in accordance with the contract and

Section 703. The sampling locations must represent the area or areas of the source where the material will be obtained. The sampling and testing shall be done by a qualified independent laboratory regardless of ownership of the source. Copies of all test reports giving complete data must be furnished to the Department by the independent laboratory for evaluation and approval. It shall be the responsibility of the Contractor to maintain and verify the quality of the material throughout the project. The materials shall meet the quality and design standards, as called for in the contract.

The use of Contractor Furnished Sources in lieu of designated sources is contingent upon no additional cost to the state, beyond that otherwise allowed in the contract, including any which may result from increase in length of haul, differences in unit weight, percent of asphalt, or other additive requirements. Adequate quantity of material is the contractor's responsibility.

106.10 Preparation of Material Source. That portion of the source necessary for the removal of the material shall be cleared and grubbed, if necessary, and shall have all earth overburden, vegetation, or other deleterious materials removed. All wasted material and debris shall be disposed of in accordance with all appropriate laws, ordinances, and regulations. Stripping of overburden from deposits will be measured and paid for as provided in Section 207 - Stripping Material Deposits. Clearing and grubbing shall be considered subsidiary work and will not be paid for separately.

The Contractor shall be responsible for construction and maintenance of haul roads from material sources to the site of the work or to the nearest public road. Maintenance shall include dust abatement.

Discharge of turbid waters which would create pollution shall not be allowed into any stream or other bodies of water.

106.11 Production of Material. Should the source contain an excessive amount of sand or contain material of an unacceptable quality, such material shall be rejected prior to crushing the material in the secondary crusher or rolls. All acceptable materials from designated sources, regardless of size, shall be used in the production of aggregate.

A uniform gradation will be required. Scalping of intermediate size aggregate for other contract items will not be permitted except when such procedure will produce a material of substantially equal or better quality.

End dumping or conveyor stacking of materials over the sides of the pile shall not be permitted. Stockpiles placed by conveyors shall not be stacked over 5 ft. (1.5 m) in maximum depth prior to leveling. Leveling of material coned by conveyors shall be performed to minimize segregation of coarse and fine aggregates.

Any material from state owned or controlled sources not used in the production of construction material on the project shall remain the property of the state. Rejected materials resulting from different operations within state owned or controlled sources shall be stockpiled as directed. The material shall be stockpiled within the source whenever possible. If the reject material is required to be loaded and hauled to a stockpile site outside the source, to a location not over 0.5 mi. (1 km) beyond the source boundaries, the Contractor will be paid 45 cents/CY (60 cents/m^3), which sum shall be full compensation for loading, hauling, and stockpiling. Royalty will be paid for all material removed from the source including rejects. Material required to be hauled to stockpile sites over 0.5 mi. (1 km) beyond the source boundary will be paid for hauling the distance in excess of the 0.5 mi. (1 km) as extra work. In the production of cover coat material where an item is included for providing sanding material in stockpile (Subsection 403.03, 9 Part C) the above pay provisions for reject material will apply after the plan quantity of sanding material has been reached.

If material is to be stockpiled, it shall be placed in a neat and regular form and shall occupy as small an area as practicable. The foundation upon which the stockpile is to be placed shall be cleared and grubbed and shall have a base of material placed to prevent contamination of the material. Unless otherwise permitted the stockpile shall be built upward in successive layers less than 3 ft. (1 m) in thickness.

Crushing, screening, and hot plants shall be equipped with approved sampling equipment operable from the ground or a platform. The device shall be constructed and operated so that it will move at a constant rate across the full width of the falling column of material from the discharge belt or chute. The sampling equipment shall be constructed so that a representative sample can be taken and conveyed to the ground by means of a slide, chute, or other means where the sampled material can be safely and conveniently collected.

The Contractor shall be responsible for process control testing and the State shall be responsible for acceptance testing and independent quality assurance testing of material produced from all sources. Contractor process control testing may be done by an independent laboratory or by an approved on-going quality control program

within the company. Average stockpile gradations and other records of specified tests shall be made available upon request.

106.12 Depletion of Designated Sources. If the designated sources have been depleted, a new source of material will be designated. The Contractor will be reimbursed at actual cost for any additional expense in connection with developing and reclaiming the new source of material including the actual cost of moving any production plants.

No extension of time will be allowed for loss of time moving a plant between designated sources except when all designated sources have been depleted or otherwise found unsatisfactory.

106.13 Changes in Haul. If a change in the design or designated source results in a decrease or increase in the average haul, an adjustment will be made for or against the Contractor. The adjustment shall be made in accordance with the provisions of Subsection 104.03. The above shall only apply to aggregates contained in Section 300 - Bases, and Section 400 - Surface Courses and Pavement, of these specifications.

106.14 State-Furnished Material. The Contractor shall furnish all materials required to complete the work, except those specified to be furnished by the state.

Material furnished by the state will be delivered or made available to the Contractor at points specified in the special provisions.

The cost of handling and placing all materials after they are delivered to the Contractor shall be considered as included in the contract price for the item in connection with which they are used.

The Contractor will be held responsible for all material delivered by the state, and deductions will be made from any monies due to make good any shortages and deficiencies, from any cause whatsoever, and for any damage which may occur after such delivery, and for any demurrage charges.

106.15 Trade Names and Alternatives. For convenience in designation on the plans or in the specifications, or to indicate intent, certain articles or materials to be incorporated in the work may be designated under a trade name or the name of a manufacturer and his catalog information. The use of an alternative article or material

which is of equal quality and of the required characteristics for the purpose intended will be permitted subject to the following requirements: The burden of proof as to quality and suitability of alternatives shall be upon the Contractor who shall furnish all necessary information as required.

Requests to substitute alternative articles or material shall be made in writing by the Contractor and shall include complete data as to the equality of the material or article proposed. The request shall be made in ample time to permit approval without delaying the work.

106.16 Salvageable Materials Unless otherwise provided, all salvageable materials shall become the property of the Contractor and shall be removed from the site of the work or otherwise satisfactorily disposed of.

The Contractor shall certify in writing the final disposal of any hazardous materials.

SECTION 107 - LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

107.01 Laws to be Observed. The Contractor shall observe and comply with all applicable laws, ordinances, regulations, orders and decrees; and shall protect and indemnify the state and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by the Contractor, the Contractor's employees or subcontractors.

The Contractor must employ 95 percent bona fide Idaho residents as employees, except if 50 persons or less are employed the Contractor may employ 10 percent nonresidents, provided the Contractor gives preference to the employment of bona fide Idaho residents in the performance of the contract. The Contractor must pay not less than the rates of wages specified in the contract for the area in which the work is being performed, and no contract shall be let to any person, firm, association or corporation refusing to execute an agreement with the above-mentioned provisions in it; provided that in contracts involving federal-aid funds, the above requirements shall not be enforced in such a manner as to conflict with or be contrary to the federal statutes prescribing a labor preference to honorably discharged members of the armed forces of the United States, and prohibiting as unlawful any other preference or discrimination among citizens of the United States.

On federal-aid projects, each Contractor and/or subcontractor shall furnish a certified true copy of each weekly payroll to the Engineer. The certification shall include a statement that fringe benefits have been paid either directly or to an authorized agent.

107.02 Permits and Licenses. Unless otherwise specified, the Contractor shall procure permits and licenses, pay all charges, fees, and taxes, and give notices necessary and incidental to the due and lawful prosecution of the work.

Permits for stream alterations or encroachments have been obtained by the Department, copies will be provided to the Contractor for posting on the job site. Any deviation from the work authorized by these permits will require the Department to make separate application to the Idaho Department of Water Resources and the U.S. Army Corps of Engineers. Authorization from each agency must be provided to the Department and be on file at the Resident Engineer's office prior to the beginning of any work covered by these permits. All expense incurred to obtain modification to existing permits or additional permits shall be the responsibility of the Contractor.

Time delays resulting from obtaining permits shall also be at the Contractor's expense.

The Contractor shall be responsible to pay any fine, penalty and cost to mitigate for damages as assessed by the regulating authority for any work undertaken by a Contractor that is not authorized by a Corps of Engineers and Water Resources Permit. The Contractor in this situation shall also be responsible for any penalty against the state and any cost to the state for resolution of the regulatory action.

The Contractor, in consideration of securing the business of erecting or constructing public works in this state, recognizing that the business is of a transitory character, and that in the pursuit thereof the property used therein may be without the state when taxes, excises or license fees to which the business is liable become payable, agrees:

1. To pay promptly when due all taxes, other than on real property, excises and license fees due to the state, its subdivisions, and municipal and quasimunicipal corporations therein, accrued or accruing during the term of this contract, whether or not the same shall be payable at the end of such term; and

2. That if said taxes, excises and license fees are not payable at the end of said term, but liability for the payment thereof exists, even though the same

constitutes liens upon the Contractor's property, to secure the same to the satisfaction of the respective officers charged with the collection thereof.

3. That, in the event of his default in the payment or securing of such taxes, excises and license fees, to consent that the Department, officer, board or taxing unit entering into this contract may withhold from any payment due hereunder the estimated amount of such accrued and accruing taxes, excises and license fees for the benefit of all taxing units to which said Contractor is liable.

By consenting to 100 percent progress payments or the release of retainage, the surety agrees to be bound for any and all payments found to be due, or are due, to any taxing authority by reason of this project.

Attached hereto and incorporated herein by reference is a copy of the Section 404 Permit obtained by the State for this project. The Contractor shall comply with all provisions of the permit and require compliance with the Permit by all subcontractors, suppliers, and any other parties in privity of contract with the Contractor. Any violation of the Section 404 - Permit by the Contractor or any party he is in privity of contract with either directly or indirectly, shall be a breach of contract and the contract may be terminated at the State's option in accordance with Standard Specification 108.08. The Contractor shall be responsible for all civil penalties resulting from the violation, whether or not they are levied against the State or the contractor.

Work in Contractor selected noncommercial areas outside of the project limits may be subject to provisions of the Clean Water Act §§ 402 and 404. Off-project work areas include, but are not limited to, material sources, disposal areas, waste areas, staging areas, and haul roads.

The Contractor shall submit written proof prior to construction activities in Contractor selected noncommercial areas outside of project limits (including but not limited to material sources, disposal sites, waste areas, haul roads, and staging areas) that such activities shall not encroach into or affect any regulated wetlands of the United States as defined by the U.S. Army Corps of Engineers' 1987 Wetland Delineation Manual. The written proof shall be satisfactory to the Resident Engineer. The Resident Engineer may require the written proof be prepared by a wetland specialist.

107.03 Licensing of Contractors. Bidders shall be licensed in the state of Idaho by the Idaho Public Works Contractors License Board in the class and type specified for the value and scope of work to be done in accordance with the provisions of Title

54, Chapter 19, Idaho Code as amended. On projects involving federal funds, the bidder shall possess or obtain a license in the class and type above mentioned prior to award of contract. On projects involving state funds only, the bidder shall possess a license in the class and type specified prior to submitting the bid upon said project. Subcontractors that are required to be listed in the bid proposal shall possess a license of the class and type specified prior to submission of the bid on state financed projects.

The class of license specified for the value of the work to be done is as follows:

Class AAA, for the work of unlimited value

Class AA, for the work involving an estimated cost of not more than $3,000,000

Class A, for the work involving an estimated cost of not more than $1,000,000

Class B, for the work involving an estimated cost of not more than $500,000

Class C, for the work involving an estimated cost of not more than $100,000

Class D, for the work involving an estimated cost of not more than $50,000

Subcontractors undertaking to perform any work covered by the contract must possess or obtain a license as above.

Professional Service providers need not have public works licenses but must have a professional license or certification in the State of Idaho for the profession they are practicing on the project.

107.04 Patented Devices, Materials and Processes. If the Contractor employs any design, device, material or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the patentee or owner. The Contractor and the surety shall indemnify and save harmless the state, any affected third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the state for any costs, expenses and damages which it may be obliged to pay by reason of any infringement, at any time during the prosecution or after the completion of the work.

107.05 Restoration of Surfaces Opened by Permit. When an individual, firm or corporation is authorized through a duly executed permit from the state, the Contractor shall allow parties bearing such permits, and only those parties, to make openings in the highway.

When ordered in writing, the Contractor shall make all necessary repairs due to such openings and such work shall be paid for as provided in Subsection 104.03 and shall be subject to the same conditions as original work performed.

107.06 Traffic Control Devices. The Contractor shall provide, erect and maintain all traffic control devices as required by these specifications, and shall take all necessary precautions for the protection of the work and the safety of the public.

Traffic Control Devices shall conform to the Manual on Uniform Traffic Control Devices, as adopted by the State, published by the U.S. Department of Transportation, Federal Highway Administration. The erection and removal of traffic control devices shall be approved by the Engineer.

107.07 Use of Explosives. When the use of explosives is necessary for the prosecution of the work, the Contractor shall exercise the utmost care not to endanger life or property.

The transportation, use and storage of explosives shall be in compliance with applicable federal, state and local laws, regulations and ordinances. The Contractor shall notify each public utility company having structures in proximity to the site of the work of the intention to use explosives, and such notice shall be given sufficiently in advance to enable the companies to protect their property from injury.

107.08 Protection and Restoration of Property and Landscape. The Contractor shall be responsible for the preservation of all public and private property and shall protect carefully from disturbance or damage land monuments and property marks until the Engineer has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for damage or injury to property of any character during the prosecution of the work resulting from any act, omission, neglect or misconduct in the manner or method of executing the work, or at any time due to defective work or materials, and said responsibility will not be released until the project shall have been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding or otherwise restoring as may be directed, or make good such damage or injury in an acceptable manner. All such repairing, rebuilding or restoration shall be at the Contractor's expense. All such repairing, rebuilding, or restoration shall be completed in a timely manner to minimize loss and/or inconvenience to the property owner.

107.09 Forest Protection. In carrying out work within or adjacent to state or national forests, the Contractor shall comply with all regulations of the authority having jurisdiction governing the protection of forests and the carrying out of work within forests.

The Contractor shall take all reasonable precaution to prevent and suppress forest fires and shall require employees and subcontractors, both independently and at the request of forest officials, to do all reasonably within their power to prevent and suppress and to assist in preventing and suppressing forest fires and to make every effort to notify a forest official at the earliest possible moment of the location and extent of any fire seen by them.

107.10 Responsibility for Damage. The Contractor shall indemnify, save harmless and defend, regardless of outcome, the Department, its agents, officials, employees, Public owner of the project (known as Local Public Agency and Local Sponsor), and the state from the expenses of and against all suits, actions, claims, or costs, expenses and attorney fees that may be incurred because of any injuries or damages received or sustained by any person, persons or property on account of the operations of the Contractor or subcontractors; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect or misconduct of the Contractor or subcontractors; or because of any claims or amounts recovered from any infringements of patent, trademark or copyright; or from any claims or amounts arising or recovered under the Workers' Compensation Act or any other law, ordinance, order or decree.

The Contractor shall carry such public liability and property damage insurance that will protect the Contractor and the Department, its agents, officials, employees, Public owner of the project (know as Local Public Agency and Local Sponsor) and the state

from claims for damages for bodily injury, including accidental death, as well as for claims for property damages, which may arise from operations under the contract whether such operations be by the Contractor or by any subcontractor or by anyone directly or indirectly employed by either of them and the amounts of such insurance shall not be less than:

1. Comprehensive or Commercial General Liability Insurance with a minimum combined single limit of $2,000,000 each occurrence. The policy shall include coverage for bodily injury, broad form property damage (including completed operations), personal injury (including employee acts), blanket contractual, Contractor's protective, products and completed operations. Further, the policy shall include coverage for the hazards commonly referred to as XCU (explosion, collapse and underground). This protection may be provided by the subcontractor, naming the Prime Contractor and state as insureds. This supplemental insurance must be submitted prior to the subcontractor starting XCU operations.

   If the Comprehensive or Commercial General Liability insurance policy contains an aggregate limit, it shall not be less than $4,000,000.

2. Comprehensive Automobile Liability Insurance with a combined single limit for bodily injury and property damage of not less than $2,000,000 each occurrence with respect to Contractor's owned, hired or nonowned vehicles, assigned to or used in performance of work.

The insurance required by paragraph 1 above shall be endorsed to include the Department, its agents, officials, employees, Public owner of the project (known as Local Public Agency and Local Sponsor), and the state of Idaho as additional insureds and shall stipulate that the insurance afforded the Contractor shall be primary insurance and that any insurance carried by the Department, its agents, officials, employees, Public owner of the project (known as Local Public Agency and Local Sponsor), and the state of Idaho shall be excess and not contributory insurance to that provided by the Contractor. The insurance shall contain a separation of insureds provision.

The Contractor shall not commence any portion of work under the contract prior to obtaining the appropriate insurance required for the activity under this provision, and a certificate or other proof of current coverage has been furnished to and accepted by the state. All insurance policies and certificates must be signed copies. The

signature shall be in a contrasting color to differentiate it as an original. After work commences, the Contractor will keep the required insurance in force until written acceptance of the project. Supplemental insurances for some portions of the work, such as work on railroad property or XCU operations, may be terminated at the completion of those activities with the Engineer's approval.

In addition to the above required liability insurance coverage, the Contractor shall carry Workers' Compensation Insurance as required by Idaho Code covering the Contractor's and subcontractor's work force. Certifications of Workers' Compensation Insurance shall correspond to the requirements for liability insurance certification included herein.

The certifications must state that no cancellations or changes of any of the required policies shall be effective without 30 days prior written notice to the state and railroad or railway company involved.

Upon written acceptance of the project by the state, the Contractor will be relieved of responsibility to the public for subsequent injury or damage on the project.

107.11 Contractor's Responsibility for Work. Until written acceptance of the project, the Contractor shall have the charge and care of the project and shall take every precaution against injury or damage to any part thereof by the action of the elements, or from any other cause, whether arising from the execution or from the non-execution of the work.

In case of suspension of work the Contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project; provide for normal drainage; protect erodible surfaces by approved erosion and sediment control measures; prevent water pollution and prevent damage by sedimentary deposits; and erect any necessary temporary structures, signs, or other facilities. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor.

107.12 Contractor's Responsibility for Utility Property and Services. Work shall not commence where the Contractor's operations are adjacent to utilities

facilities or other property where damage, loss, or inconvenience may result until all arrangements necessary for damage prevention have been made.

The Contractor shall contact a representative of each utility service involved on the project to ascertain the location of any underground facilities that may be affected by the construction of the project.

The Contractor shall make accommodation for utility owners or their authorized agents to enter upon the highway for the purpose of making necessary emergency connections or repairs to their facilities.

The Contractor shall promptly notify the owner of any utility services of any service interruption resulting from accidental breakage, facility exposure, unsupported facility, or any other damage by the Contractor's operation and shall cooperate with the owner in the restoration of services. If any service is interrupted, repair work shall be continuous until the service is restored. No work shall be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority.

If the Contractor constructs or reconstructs any structure during the irrigation season, the Contractor shall provide temporary ditches, siphons or other structures as directed, for the purpose of conveying the water without waste, loss or delay.

107.13 Personal Liability of Public Officials. In carrying out any of the provisions of this contract or in exercising any power or authority granted to them thereby, there shall be no personal liability upon the board, administrator, or their authorized representatives, either personally, or as officials of the Sstate, it being understood that in all such matters they act solely as agents and representatives of the State.

107.14 No Waiver of Legal Rights. The Sstate shall not be precluded or estopped by any measurement, estimate or certificate made either before or after the completion and acceptance of the work and payment therefore, from showing the true amount and character of the work performed and materials furnished by the Contractor; nor from showing that any such measurement, estimate or certificate is untrue or is incorrectly made; nor that the work or materials do not in fact conform to the contract. The State shall not be precluded or estopped, notwithstanding any such measurement, estimate or certificate and payment in accordance therewith, from recovering from the Contractor or sureties, or both, such damage as it may sustain by reason of the Contractor's failure to comply with the terms of the contract. Neither

the acceptance by the State or any representative of the State; nor any payment for or acceptance of the whole or any part of the work; nor any extension of time; nor any possession taken by the State, shall operate as a waiver of any portion of the contract or of any power herein reserved, or of any right to damages. A waiver of any breach of the contract shall not be held to be a waiver of any other or subsequent breach.

107.15 Access to Records. The Contractor and any subcontractors shall maintain all books, documents, papers, accounting records and other evidence pertaining to costs incurred and agree to make such materials available at their respective offices at all reasonable times during the contract period and for 3 years from the date of final payment to the state by the Federal Highway Administration of federal-aid projects and for 5 years following payment to the Contractor by the state on nonfederal-aid projects. These documents shall be available at reasonable times and places for inspection by authorized representatives of the state or federal government. Copies thereof shall be furnished if requested.

107.16 Sanitary, Health and Safety Provisions. Attention is directed to federal, state and local laws, rules and regulations concerning construction safety and health standards. The Contractor shall not require any workers to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to their health or safety.

Restroom facilities shall be provided for project personnel. This may necessitate provision of portable facilities for moving operations.

107.17 Environmental Protection. The Contractor shall comply with all federal, state and local laws and regulations pertaining to protection of the environment. The Storm Water Pollution Prevention (SWPP) plan, erosion and sediment control plan, and best management practices shall be followed to prevent pollution of surface and groundwater, soil, and the atmosphere with any contaminate including hazardous or toxic materials. Any release of these materials into the environment will require immediate corrective action by the Contractor in accordance with applicable state and federal regulations.

If, during the construction of the project, an underground storage tank, buried drum, other container, contaminated soil, or debris not scheduled for removal under the contract are discovered, the Contractor shall immediately notify the Engineer. No attempt shall be made to excavate, open, or remove such material without written approval.

The Contractor shall conduct and schedule his operations and abide by the conditions of any state or federal permit to avoid or minimize impacts on streams, lakes, wetlands, reservoirs, aquifers, and associated fish and wildlife habitat. The Contractor shall not use for any purpose public recreation areas, regulatory floodways, wetlands or critical habitat without written approval.

107.18 Cultural Resource Protection. The Contractor shall comply with all federal and state laws and regulations governing the protection of cultural resources. These resources include those things identified in Subsection 101.02 - Cultural Resource, and can also include but are not limited to artifacts such as bottles, projectile points, stone flakes, mortars, and pottery. Cultural resources require identification protection and preservation. Any area used by the Contractor associated with a highway project inside or outside the project limits shall receive a cultural resource clearance approved by the State Historic Preservation Office (SHPO) prior to use.

When the Contractor's operations encounter previously unidentified cultural resources in any area used in association with the project including material sources, those operations shall be temporarily discontinued or immediately moved to another area of the project. If the unexpected find is within the project area previously cleared by the state, the Engineer will immediately arrange for cultural resource investigation. The Contractor shall be reimbursed for unavoidable expenses as provided in Subsection 105.01.

Any additional area established by the Contractor for use with the project will require cultural resource clearance. All sources, stockpiles, disposal sites, staging areas, etc., must have clearance prior to any work within the proposed area. The Contractor shall notify the Engineer as soon as these use areas are known, in order to facilitate the clearance process. Disturbance of cultural resources in such proposed areas prior to obtaining cultural resource clearance may preclude use of the area for the project.

The Contractor will obtain clearance, with concurrence of the SHPO, to assure compliance with the requirements of this subsection. The Engineer may assist the Contractor in arranging cultural resource investigation. If the state is unable to provide for timely cultural resource investigation, the Contractor may contract such services with a qualified professional archeologist. All Consultant investigations and reports shall be coordinated by the Engineer, through the Highway Archeologist with

review and concurrence by the SHPO. Consultant qualifications and performance must meet SHPO standards.

The Contractor shall be responsible for all expenses involved in obtaining any clearance not provided by the state. Any delay created by the clearance and SHPO concurrence shall not relieve the Contractor from any obligations under the contract.

Any additional testing or mitigation that may be required to obtain cultural resource clearance shall be the Contractor's responsibility. A minimum of 30 days should be allowed to obtain a clearance, provided no cultural sites are located. If sites are found, clearance may be delayed or disallowed.

107.19 Fencing. The Contractor shall be responsible for the confinement of livestock during the prosecution of the contract. The Contractor shall make advance written notification to all adjacent landowners prior to the removal of any portion of any fence. Verbal contact shall also be made with adjacent landowners 48 hours in advance of the actual fence removal. Evidence of contact with adjacent landowners shall be submitted to the state prior to commencement of fence removal.

SECTION 108 - PROSECUTION, PROGRESS AND TERMINATION

108.01 Subletting of Contract. The Contractor shall not sublet, sell, transfer, assign or otherwise dispose of the contract or contracts or any portion thereof, or of the Contractor's right, title or interest therein, without written consent of the Engineer. If the Contractor proposes to sublet plumbing, heating, air conditioning or electrical work, the subcontractors for these shall be named in the proposal. In case consent is given, the Contractor will be permitted to sublet a portion of the work but shall perform with the Contractor's own organization, work amounting to not less than 50 percent for federal-aid contracts and 20 percent for state contracts of the total original contract cost, except that any items designated in the contract as "specialty items" may be performed by subcontract and the cost of any such specialty items so performed may be deducted from the total original contract cost before computing the amount of work required to be performed by the Contractor's own organization. Cost of items required to be supplied by the Contractor at stipulated prices or at invoice prices and which are not reflected in the bid schedule shall be added to the total original cost for the purpose of determining the minimum percentages specified above. Cost of items at invoice prices shall be based on either supported quotations as required or as shown on the Department's detailed estimate of costs. No subcontractor will be permitted to work on the project until consent is given and the

subcontract agreement, with all required inclusions and signatures, has been approved.

Consent to subcontract any portion of the work will not relieve the Contractor of any responsibility for performance of the contract. Subcontracting shall create no contract between the State and the subcontractor, nor shall the subcontractor have any right against the state by reason of its subcontract with the Contractor. The Contractor shall be responsible for all work and material furnished and no subcontract shall in any case release the Contractor of any obligations or liability under the contract and the Contractor's bond.

108.02 Prosecution of Work. The Notification of Award will stipulate the date on which it is expected the Contractor will begin construction and from which date contract time will be charged.

No work shall begin on the project until the contract has been fully executed.

Unless otherwise noted in the Special Provisions, the Contractor shall furnish the Engineer with each of the following schedules:

1. Gantt Chart (Bar Chart)
2. CPM Schedule

Acceptance of any schedule shall not relieve the Contractor of his responsibilities to adjust labor and equipment forces or work schedules and provide sufficient materials to complete the work within the contract time. The initial schedule will not be accepted unless it satisfies contract milestones, intermediate contract completion dates and the contract completion date and shall show the scheduled completion date and the substantial completion date when applicable. It is understood by the Engineer and the Contractor that float within the construction schedule is not for the exclusive use or benefit of either party, but is a resource available to both parties as needed to meet contract milestones, intermediate contract completion dates and the contract completion date.

Unless noted elsewhere, the Contractor shall allow the Engineer a reasonable amount of time to perform his activities. Reasonable will be defined as "customary or normal" for the type of work involved. The Contractor will allow a reasonable amount of time in his schedule for resubmittals.

The Critical Path is the series of activities in a project schedule that will take the longest total amount of time to complete. Therefore, at any point in time, the critical path will be the path with the least amount of total float. The critical path does not have to follow the same logic path from start to finish and does not have to have zero total float.

Total Float is the total number of days that a scheduled activity can be delayed without affecting the intermediate or contract completion date.

Should the prosecution of the work be discontinued or changed for any reason, the Contractor shall notify the Engineer at least two days in advance of changing or resuming operations.

All costs incurred by the Contractor in preparing and updating the schedules shall be incidental to other items. The Engineer may withhold progress payments if the Contractor fails to provide the schedules and updates as required.

Two copies of the initial schedule shall be submitted to the Engineer at or before the preconstruction conference.

Following review of, and within 10 calendar days of its submission, the Engineer and the Contractor shall meet for joint review, correction and adjustment of the initial schedule. After this meeting, but within 10 calendar days, the initial schedule shall be resubmitted to the Engineer. If necessary, this process shall be repeated. However, the schedule must be finalized within 30 calendar days after "Notification of Award."

Jobsite progress meetings shall be held monthly for the purpose of updating the schedule. Progress will be reviewed to verify actual start and finish dates, remaining duration and percent complete of uncompleted activities, and any proposed revisions to the schedule. It is the Contractor's responsibility to provide the Engineer with the status of activities at this progress meeting and prepare schedule updates based on this information once it has been verified and agreed upon. The Contractor shall submit two copies of the updated schedule monthly and at project completion the final as-built schedule. Final acceptance of the project will not be given until the final as-built schedules are received and accepted. A written narrative describing the project schedule status, the critical path and any revisions to the schedule shall be included with the update. The updated schedule will be resubmitted should it not contain the agreed upon information.

At the written request of the Engineer, and within 7 calendar days, the Contractor shall submit two copies of a supplemental schedule if the actual prosecution of the work is, as determined by the Engineer, significantly different than that represented on the schedule. No extra payment will be made for a supplemental schedule should it be required.

1. Gantt Chart. The chart shall conform to the following specifications:

    a. The Gantt chart shall include all activities and constraints that affect the schedule. Activities shall include, but are not limited to engineering, surveying, permitting, submittals, approvals, procurement, fabrication and construction.

    b. If the Gantt chart is developed from a CPM schedule, it shall, at a minimum, indicate for each activity the remaining duration, the scheduled or actual start and finish dates, the total float, and whether or not the activity is on the critical path.

    c. If the Gantt chart is not developed from a CPM schedule, it shall, at a minimum, indicate for each activity the remaining duration, the scheduled or actual start and finish dates, and whether or not the activity is on the critical path.

    d. No activity duration may be longer than 20 days without the Engineer's approval.

    e. The activities are to be described so that the work is readily identifiable and the progress on each activity can be readily measured.

    f. The chart shall have time-scaled bars plotted on a horizontal time scale that is the project calendar to indicate activity durations and dates.

    g. The chart shall indicate the number of work days per week, shifts per day, hours per shift, holidays, a general description of the major equipment to be used, contract milestones, intermediate contract completion dates, the contract completion date, and the substantial completion date when applicable.

    h. Updated charts shall show the progress of each activity, the percent complete, remaining duration, and all schedule revisions.

2. CPM Schedule. The construction of this project will be planned and recorded with a conventional Critical Path Method (CPM) schedule.

   At a minimum, the submittal shall include one electronic copy of CPM schedule compatible with Suretrack or Microsoft Project on 3.5" floppy disk, or other medium approved by the Engineer, and two copies of the following:

   a. Time-Scaled Logic Diagram
   b. Network Report
   c. Schedule Report sorted by activity or node number

   The Time-Scaled Logic Diagram shall conform to the following specifications:

   a. Either an arrow diagram or a precedence diagram will be acceptable.

   b. The logic diagram shall be plotted on sheets with a horizontal time scale that is the project calendar. The plotted length of each activity shall correspond to its duration and dates on the horizontal time scale. Logic diagrams that are not plotted according to a horizontal time scale will not be acceptable.

   c. The diagram shall be furnished on full size 22 in. x 34 in. (559 mm x 864 mm) sheets or as approved by the Engineer.

   d. Activity information shall include activity numbers, activity descriptions, durations, total float, and scheduled or actual start and finish dates.

   e. The diagram shall clearly show the sequence and interdependence of all activities required for complete performance of all items of work under the contract and shall indicate the critical path.

   f. Activities shall include, but are not limited to, engineering, surveying, permitting, submittals, approvals, procurement, fabrication, utility work, and construction. All schedule constraints, contract milestones, intermediate contract completion dates, the contract completion date, and the substantial completion date when applicable shall be shown. All dummies, leads, and lags shall be identified. With Engineer's approval, dummies may be hidden on graphics for the sake of clarity.

g. No activity duration shall be longer than 20 days without the Engineer's approval. The Engineer also reserves the right to limit the number of activities on the schedule.

h. The activity descriptions and durations shall be such that the work is readily identifiable and the progress on each activity can be readily measured.

i. The diagram shall indicate the number of work days per week, shifts per day, hours per shift, holidays, and a general description of the major equipment to be used.

The Network Report shall completely define the schedule logic. It will clearly indicate all logical relationships, lags and constraints.

The Schedule Report shall provide the following information for each activity: activity number, activity description, activity calendar, original duration, remaining duration, percent complete, scheduled or actual start and finish dates, late start and finish dates, free float and total float.

108.03 Preconstruction and Preoperational Conferences. The Contractor shall meet with the Engineer for a preconstruction conference at a time mutually established. At this time the Contractor shall submit the progress schedule, a list of material suppliers, subcontractors and other data requested.

The preconstruction conference should be used to establish an effective working understanding between the Contractor and the Engineer, as well as other affected agencies.

The Contractor shall also meet with the Engineer for preoperational conferences as required prior to beginning any new phase of work to more thoroughly establish effective working understandings when more detail is required than was provided in the preconstruction conference.

108.04 Limitation of Operations. The Contractor shall not start an operation where traffic is involved until traffic control devices are completely installed and approved. The Contractor shall conduct the work at all times in such a manner and in such sequence as will assure the least interference with traffic. The Contractor shall have due regard to the location of detours and to the provisions for handling traffic. The Engineer may require the Contractor to finish a section on which work is

in progress before work is started on any additional sections if the opening of such section is essential to public convenience.

The first phase of the grading Contractor's operations shall be to complete the excavation and/or embankments for the construction of the structures to be let under a separate contract.

The Contractor shall be prohibited from working on any roadway open to the traveling public, except for normal maintenance operations, on any day of a 3-day holiday weekend or on July 3, 4 and 5, unless otherwise permitted.

108.05 Methods, Equipment and Character of Workers. The Contractor shall at all times employ sufficient labor and equipment for prosecuting the several classes of work to full completion in the manner and time required by these specifications.

Workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Any person employed by the Contractor or by any subcontractor who, in the opinion of the Engineer, does not perform the work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Engineer, be removed forthwith by the Contractor or subcontractor employing such person, and shall not be again employed in any portion of the work without approval.

Should the Contractor fail to remove such person or persons as required above, or fail to furnish suitable and sufficient personnel for the proper prosecution of the work, the Engineer may suspend the work by written notice until the request is complied with.

Equipment used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the project shall be such that no injury to the roadway, adjacent property or other highways will result from its use. Parked or unattended equipment along the roadside shall be located 30 ft. (9 m) or more from the edge of traveled way unless otherwise approved by the Engineer. If the area has a posted regulatory speed limit of 40 mph (65 km/hr) or less, the distance may be reduced to 10 ft. (3 m), if approved.

When the methods and equipment to be used by the Contractor in accomplishing the construction are not prescribed in the contract, the Contractor may use any methods or equipment that will satisfactorily accomplish the contract work in conformity with the contract requirements.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized. If the Contractor desires to use a method or type of equipment other than those specified in the contract, the Contractor may request authority from the Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the Engineer determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove the deficient work and replace it with work of specified quality, or take such other corrective action as the Engineer may direct. No change will be made in basis of payment for the construction items involved nor in contract time as a result of authorizing a change in methods or equipment under these provisions.

108.06 Determination and Extension of Contract Time.

Determination of Contract Time: The contract time allowed to complete the work will be stated in the proposal and contract.

When contract time is specified as a fixed completion date, it shall be the date on which the project shall be completed. When contract time is on a calendar day or working day basis, it shall consist of the number of calendar days or working days stated in the contract, starting on the date stipulated in the Notification of Award.

When the contract time is on a working day basis, the Engineer will furnish the Contractor a monthly statement showing the number of days charged to the contract for the preceding month and the number of days remaining for completion of the contract. The statement shall be considered accepted by the Contractor as correct unless he files a written protest within one week stating why he considers said monthly statement incorrect.

No working days will be charged during the months of December, January, or February.

The Contractor shall substantially complete the contract work within the contract time. A project is substantially complete when it can be safely used by the public without further delays, disruption, or impediments. For conventional bridge and highway work, substantial completion is when all bridge deck, parapet, pavement structure, shoulder, permanent signing and markings, traffic barrier and safety appurtenance work is complete. Contract time will not be charged after substantial completion of the work as evidenced in writing by the Engineer, as long as the Contractor diligently continues to bring the project to completion.

Time Extensions: Any request for a time extension shall be submitted to the Engineer in writing no later than seven (7) calendar days after the delay occurs. As determined by schedule analysis, only delays in activities, which affect contract milestones, intermediate contract completion dates, or the contract completion date will be considered for a time extension. The request shall be in writing and include a detailed narrative description of the reason(s) for the requested contract time extension including:

1. Cause of the delay
2. Start date of the delay
3. Duration of the delay
4. Activities affected
5. Methods employed to mitigate the delay
6. Number of days to be added to the contact time supported by the updated schedule submitted and accepted prior to the delay

The contract time may be extended for:

1. Overrun in quantities
2. Changes and extra work
3. Differing site conditions
4. Contingency item work
5. Unreasonable suspensions of work
6. Exceeding the time specified in the contract for approval of properly prepared and acceptable submittals
7. Unavoidable utility delays
8. Delays from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, Subcontractors, or supplier at any tier. Such causes may include unusually severe weather based on a 10-year history, area-wide material shortages, fires, floods, declared natural disasters or strikes.

The Contractor's plea that insufficient contract time was specified is not a valid reason for extension of time.

If a time extension is justified, the Engineer will establish a new contract time.

108.07 Failure to Complete on Time. For each working day charged after the contract time specified for the completion of the work required by the contract, the sum specified in the contract will be deducted from any money due the Contractor, not as a penalty but as liquidated damages; provided, however, that due account shall be taken of any adjustment of the contract time for completion of the work granted under the provisions of Subsection 108.06. When the contract time expires on working days, calendar days and completion date contracts, liquidated damages will be charged on a working day basis for those days required to complete the contract.

When contract time is a completion date or a number of calendar days, working days will be charged during the months of December, January and February for the purposes of determining liquidated damages.

Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a waiver on the part of the state of any of its rights under the contract.

108.08 Default and Termination of Contract.
If the Contractor:

1. Fails to begin the work under the contract within the time specified in the Notification of Award; or

2. Fails to perform the work with sufficient labor and equipment or with sufficient materials to assure the prompt completion of the work; or

3. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable; or

4. Discontinues the prosecution of the work; or

5. Fails to resume work which has been discontinued within a reasonable time after notice to do so; or

6. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency; or

7. Makes an assignment for the benefit of creditors; or

for any other cause whatsoever, fails to carry on the work in an acceptable manner, the Engineer will give notice in writing to the Contractor and surety of such delay, neglect or default.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the state will, upon written notification from the Engineer of the fact of such delay, neglect or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the prosecution of the work out of the hands of the Contractor. The state may appropriate or use any or all materials and equipment on the ground as may be suitable and acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the Engineer will be required for the completion of the contract in an acceptable manner.

Costs and charges incurred by the state, together with the cost of completing the work under the contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the state the amount of such excess. If, after termination of the contract in accordance with this subsection, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the state in accordance with Subsection 108.09.

108.09 Termination for Convenience of the State.

1. The performance of work under this contract may be terminated by the state in accordance with this subsection in whole, or from time to time in part, whenever the Engineer shall determine that such termination is in the best interest of the state. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective.

2. After receipt of a Notice of Termination, and except as otherwise directed by the Engineer, the Contractor shall:

   a. Stop work under the contract on the date and to the extent specified in the Notice of Termination;

   b. Place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portion of the work under the contract as is not terminated;

   c. Terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the Notice of Termination;

   d. Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts with the approval or ratification of the Engineer to the extent required, which approval or ratification shall be final for all the purposes of this subsection;

   e. Transfer title and deliver to the state, in the manner, at the times, and to the extent, if any, directed by the Engineer, the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced as a part of, or acquired in connection with the performance of, the work terminated by the Notice of Termination; and the completed or partially completed plans, drawings, information, and other property which, if the contract had been completed, would have been required to be furnished to the state;

   f. Complete performance of such part of the work as shall not have been terminated by the Notice of Termination; and

   g. Take such action as may be necessary, or as the Engineer may direct, for the protection and preservation of the property related to this contract which is in the possession of the Contractor and in which the state has or may acquire an interest.

   At any time, the Contractor may submit to the Engineer a list, certified as to quantity and quality, of any or all items of termination inventory, and may request the state to remove such items or enter into a storage agreement covering them. Not later than 15 days thereafter, the state will accept title to such items and

remove them or enter into a storage agreement covering the same; provided, that the list submitted shall be subject to verification by the Engineer upon removal of the items or if the items are sorted, within 45 days from the date of submission of the list, and any necessary adjustments to correct the list as submitted shall be made prior to final settlement.

3. After receipt of a Notice of Termination, the Contractor shall submit to the Engineer his termination claim. Such claim shall be submitted promptly but in no event later than 90 days from the effective date of termination, unless one or more extensions in writing are granted by the Engineer, upon request of the Contractor made in writing within such 90-day period of authorized extension thereof. However, if the Engineer determines that the facts justify such action, the Engineer may receive and act upon any such termination claim at any time after such 90-day period or any extension thereof. Upon failure of the Contractor to submit the termination claim within the time allowed, the Engineer may determine, on the basis of information available, the amount, if any, due to the Contractor by reason of the termination and shall thereupon pay to the Contractor the amount so determined.

4. Subject to the provisions of paragraph 3, the Contractor and the Engineer may agree upon the whole or any part of the amount or amounts to be paid to the Contractor by reason of the total or partial termination of work pursuant to this subsection, which amount or amounts may include an allowance for profit on work done equal to that provided in Subsection 109.03; provided, that such agreed amount or amounts, exclusive of settlement costs, shall not exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the contract price of work not terminated. The contract shall be amended accordingly, and the Contractor shall be paid the agreed amount. Nothing in paragraph 5 of this subsection, prescribing the amount to be paid to the Contractor in the event of failure of the Contractor and the Engineer to agree upon the whole amount to be paid to the Contractor by reason of the termination of work pursuant to this subsection, shall be deemed to limit, restrict, or otherwise determine or affect the amount or amounts which may be agreed upon to be paid to the Contractor pursuant to this paragraph 4.

5. In the event of the failure of the Contractor and the Engineer to agree, as provided in paragraph 4, upon the whole amount to be paid to the Contractor by reason of the termination of work pursuant to this subsection, the Engineer shall pay to the

Contractor the amounts determined by the Engineer as follows, but without duplication of any amounts agreed upon in accordance with paragraph 4:

a. With respect to all contract work performed prior to the effective date of the Notice of Termination, the total (without duplication of any items) of:

   (1) the cost of such work;

   (2) the cost of settling and paying claims arising out of the termination of work under subcontracts or orders as provided in paragraph 2(d) above, exclusive of the amounts paid or payable on account of supplies of materials delivered or services furnished by the subcontractor prior to the effective date of the Notice of Termination of work under this contract, which amounts shall be included in the cost on account of which payment is made under (1) above; and

   (3) a combined sum for overhead and profit equal to that provided in Subsection 109.03; provided, however, that if it appears that the Contractor would have sustained a loss on the entire contract had it been completed, no profit shall be included or allowed under this subdivision and an appropriate adjustment shall be made reducing the amount of the settlement to reflect the indicated rate of loss; and

b. The reasonable cost of the preservation and protection of property incurred pursuant to paragraph 2(g); and any other reasonable cost incidental to termination of work under this contract, including expense incidental to the determination of the amount due to the Contractor as the result of the termination of work under this contract.

The total sum to be paid to the Contractor under (a) above shall not exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the contract price of work not terminated. Except for normal spoilage, and except to the extent that the state shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the Contractor under (a) above, the fair value, as determined by the Engineer, of property which is destroyed, lost, stolen, or damaged so as to become undeliverable to the state.

6. The Contractor shall have the right of appeal, as provided by Subsection 105.17 of these specifications, from any decision or determination of the Engineer under this subsection.

7. In arriving at the amount due the Contractor under this subsection there shall be deducted: all unliquidated advance or other payments on account theretofore made to the Contractor, applicable to the terminated portion of this contract; and any claim which the state may have against the Contractor in connection with this contract.

8. If the termination hereunder be partial, the Contractor may file with the Engineer a claim for an equitable adjustment of the price or prices specified in the contract relating to the continued portion of the contract (the portion not terminated by the Notice of Termination), and such equitable adjustment as may be agreed upon shall be made in such price or prices. Any claim by the Contractor for an equitable adjustment under this subsection must be asserted within 90 days from the effective date of the termination notice, unless an extension is granted in writing by the Engineer.

9. The state may from time to time, under such terms and conditions as it may prescribe, make partial payments and payments on account against costs incurred by the Contractor in connection with the terminated portion of this contract whenever, in the opinion of the Engineer, the aggregate of such payments shall be within the amount to which the Contractor will be entitled hereunder. If the total of such payments is in excess of the amount finally agreed or determined to be due under this subsection, such excess shall be payable by the Contractor to the state upon demand.

SECTION 109 - MEASUREMENT AND PAYMENT

109.01 Measurement of Quantities. Standard measurements for all work acceptably completed under the contract will be measured according to the International System of Units, “SI” or United States Standard Measure, “English”, in accordance to Subsection 105.04. New standard sizes, or definitions, have been adopted in some instances that do not reflect direct conversion from English to SI units.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Minor quantities of materials which are specified to be measured either by volume or weight method may be converted from one to the other as determined appropriate. Factors for conversion from one method to the other will be determined by the Engineer and agreed to by the Contractor prior to making the change.

Measurements will be made as hereinafter provided unless otherwise provided for by their individual measurement specifications.

Measurements will be made horizontally or vertically. In determining the area for items bid on SY (m^2) basis, the measurement will be the neat dimensions shown on the plans or ordered in writing. No deductions will be made for individual fixtures in the pavement having an area of less than 9 SF (1 m^2).

Structures will be measured according to neat lines shown on the plans or ordered in writing.

Items which are measured by the foot (meter), such as pipe culverts, guardrail, underdrains, etc., will be measured parallel to the base or foundation upon which such structures are placed, unless otherwise shown on the plans. Items such as pipe culvert, guardrail, underdrains, etc., which are manufactured in standard lengths may be measured by multiplying the number of pieces by the nominal length.

A station, when used in the measurement of work performed, is defined as 100 ft. for English projects and 100 m for metric projects.

When the term “size number” refers to the measurement of wire, it will mean the size number specified in AASHTO M 32.

The term “Ton” will mean the short ton of 2000 lbs. The term “t” will mean the metric ton consisting of 1000 kg. Note: 2000 lbs. is equal to 907.2 kg.

Water used in the work will be by the MG. (One “MG” equals 1000 gallons). Note: 1 MG equals 3.785 m^3. (One cubic meter is equal to 1000 liters). Measurement may be made by means of calibrated tanks or distributors, or by means of accurate water meters.

Asphalt, including any anti-stripping additive if required, will be measured by the gallon or ton (liter or t). Volumes will be measured at 60°F (14 °C) or will be corrected to the volume at 60°F (14°C). Net certified weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject

to correction when asphalt has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work. When asphalt is shipped by truck or transport, net certified weights or volumes, subject to correction for loss or foaming, may be used for computing quantities. Anti-stripping additives will be measured by the percentage of additive per ton (metric ton) of asphalt.

Timber will be measured by the MFBM (cubic meter) actually incorporated in the structure. Note: MFBM is equal to one thousand feet board measure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.

The term "Lump Sum" when used as an item of payment will mean complete payment for the work described in the contract.

When a complete structure or structural unit (in effect, "Lump Sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

The term "Plan Quantity" will mean that payment for the work described will be based on the quantities shown in the contract. No further measurement will be made except for quantity changes authorized by the Engineer in accordance with the provisions of Subsection 104.02 - Variation in Quantities. If it is apparent that the actual quantity has varied from the plan quantity, the quantity of the item used will be determined by the State and payment will be made based on bid price for the actual units of quantity measured. If the Contractor does not agree with plan quantity and requests measurement, the request shall be in writing and if the quantity measured does not exceed the value of plan quantity by $2,000, the Contractor shall reimburse the state for the expenses incurred in the measurement. When any measurement is required, through obvious changes in quantity or a request by the Contractor, payment will be for actual quantity used at bid price.

Rental of equipment will be measured and paid for in accordance with Subsection 109.03 - Extra and Force Account Work.

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gage (millimeter), thickness, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

Volumes of material in stockpiles will be determined by the cross-section average end area method except that truck measurement may be used for estimated quantities less than 100 CY (100 m^3).

Items specified to be measured by the cubic yard (cubic meter) and not otherwise provided for by their individual measurement specifications will be measured in trucks.

Material measured in trucks by the cubic yard (cubic meter) or by weight will be measured in the following manner:

1. *Cubic Yard* (cubic meter) - *Truck Measurement.* Material will be measured in the vehicle at the point of delivery on the roadbed.

   Hauling shall be done only in approved vehicles, and unless all vehicles are of uniform capacity, each vehicle shall bear a plainly legible identification mark. The water level volume of the vehicles will be measured to the nearest 0.1 CY (0.1 m^3) and this volume once measured shall not be changed without the consent of the Engineer. No allowance will be made for the settlement of material in transit. Payment will not be made for material heaped above the water level capacity of the box, and deductions will be made in 0.5 CY (0.5 m^3) increments for loads less than the water level volume of the box.

2. *Weight Measurement.* Material paid for by weight will be weighed on accurate approved scales furnished by the Contractor. The installation of the scales shall be approved. Weighing shall be performed under the direct supervision of an inspector.

   Unless otherwise approved, all scales used for which payment will be made from the weight measurement shall be equipped with a controller capable of printing a weight ticket acceptable to the Engineer. The printed ticket, at a minimum, shall indicate the project name, project number, bid item number, current date, current time, load number, truck number, load gross weight, load tare weight, and load net weight. The date, time, and all weights must be printed by the controller automatically without modification by the operator. Load numbers shall be assigned sequentially for each load weighed for delivery to the project. The Contractor shall supply all labor necessary to weigh all loads and prepare weight tickets as required.

When payment for granular borrow or aggregate is on the weight basis, the water in excess of 4 percent of the dry weight of the material will not be paid for unless otherwise provided. The amount of material for which payment will be made will be corrected for moisture content, as determined in accordance with AASHTO T-255.

Trucks used to haul material being paid for by weight shall be weighed empty not less than once daily. Each truck shall bear a plainly legible identification mark.

Equipment for weighing material shall weigh accurately to within 1 percent.

Materials proportioned or measured by weight shall be weighed on beam or springless dial scales conforming to the following requirements:

a. The use of springs in the scale to carry part or all of the load will not be permitted.

b. It shall be the Contractor's responsibility to provide a commercial certificate of compliance on all weighing equipment prior to the start of hauling operations. No separate compensation shall be made for this requirement. This requirement shall be considered incidental to the pay item for the material being weighed.

c. Clearances shall be provided between the scale parts and the structure to prevent displacement of the scale parts due to vibration or any other cause. All working parts of scales, particularly knife edges, shall be so protected as to prevent any material except wind-borne material from falling upon or against them.

d. Combination vehicles may be weighed as separate units provided the approaches to the scale platform are on the same level as the scale platform for a distance long enough to assure that all units of combination vehicles are at the same elevation regardless of which unit is on the scales.

   The tractor unit shall be out of gear and all brakes shall be released while the unit or units are being weighed.

e. Plants used to proportion or batch materials by weight shall meet the following additional requirements:

(1) The graduated scale shall be in full view of the operator when the operator is in a position to operate the gate which delivers material to the weighing hopper.

(2) Hoppers and bins shall be arranged or equipped in a manner that will permit all necessary calibration operations to be performed.

(3) Platform scales shall be inspected and calibrated during the life of the contract at the discretion of the Engineer.

f. Conveyor weighing equipment meeting the requirements of the state of Idaho, Department of Agriculture, Division of Agricultural Markets, Bureau of Weights and Measures, may be used in lieu of platform scales. Conveyor weighing equipment will be checked regularly for calibration using methods specified by the manufacturer.

3. Automatic weighing equipment may be used with written approval. Material shall be weighed accurately to within 1 percent.

Material wasted or disposed of except as specified, rejected material, material not unloaded from the transporting vehicle, material placed outside of the lines indicated on the plans or as ordered, or material remaining on hand after completion of the work will not be paid for unless otherwise provided.

109.02 Scope of Payment. Payment to the Contractor will be made for the accepted quantities of contract items in accordance with the plans and specifications at the contract unit prices, except as provided in Subsections 104.02, 104.03, 104.04, 109.03, 109.04 or 109.07.

The Contractor shall accept the compensation as herein provided in full payment for furnishing all necessary materials, labor, tools, equipment and incidentals to complete the work, and for performing all work under the contract; also for all loss or damage arising from the nature of the work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work until its final acceptance by the Engineer.

109.03 Extra and Force Account Work. Extra or altered work performed in accordance with the requirements and provisions of Subsections 104.02 and 104.03 will be paid for at the unit prices or agreed prices stipulated in the order authorizing

the work or the State may require the Contractor to do such work on a force account basis, to be compensated in the following manner:

1. Labor. For all labor assigned to and foremen in direct charge of the specific force account operations, the Contractor shall receive the rate of wage, or scale, agreed upon in writing before beginning work for each and every hour that said labor and foremen are actually engaged in such work. No payment or prorating of hours will be made for general superintendence or administrative work related to the force account work.

   The Contractor shall receive the actual costs paid to, or in behalf of laborers and foremen engaged in force account work for fringe benefits expenses incurred or paid to these people. Fringe benefits include: health benefits, retirement benefits, vacation benefits, etc. but are exclusive of payroll burdens as explained below.

   An amount equal to 20 percent of the sum of the above items for a combined overhead and profit will also be paid to the Contractor.

   In addition, the Contractor shall receive the actual cost paid to, or in behalf of laborers and foremen engaged in force account work for travel and subsistence that Contractors' personnel incur while performing force account work. Travel and subsistence will be prorated for each day that the worker participates in non-force account work. Travel and subsistence rates will not exceed those currently authorized for State personnel, unless approved by the Engineer.

   Payroll burdens for workers' compensation insurance, unemployment insurance contributions, and social security taxes on the force account work shall be reimbursed to the Contractor at the actual, documented cost to which 6% will be added.

   All wages, fringes, payroll burdens and subsistence expenses will be paid at the normal, customary and legal rates unless otherwise agreed to in writing before the beginning of the work. Any charges deemed unreasonable will be disallowed by the Engineer.

2. Bonds, Insurance, and TERO Taxes. No adjustment will be made on forceaccount work for bonding, property damage and bodily injury insurance, or TERO taxes until the end of the project. When the project work is complete and

satisfactory evidence is provided by the Contractor an adjustment will be made by change order to reconcile all bonding, insurance, and TERO tax issues.

3. Materials. For materials accepted by the Engineer and used in the work, the Contractor shall receive the price agreed to before the beginning of work of such materials delivered to the project, including transportation charges paid by the Contractor (exclusive of machinery rentals as hereinafter set forth) to which cost 15 percent will be added for a combined overhead and profit.

4. Equipment. For any machinery or special equipment, other than small tools, the Contractor shall receive rental rates as established herein and agreed to in writing before the work is begun plus those transportation costs directly attributable to force account work for the actual time the equipment is in operation on force account work.

   a. General - The Rental Rate Blue Book published by Dataquest, Inc., San Jose, California (hereinafter referred to as the Blue Book), as modified herein, will be used to establish rental rates for equipment approved for use by the Engineer on force account work. The effective date of each section of the Blue Book when revised by the publisher shall be the date the revision is received by the Engineer. The rates established prior to the force account work shall apply until the ordered work is complete.

      No markups will be allowed on equipment, except as provided herein and under Subsection 109.03 - Extra and Force Account Work, Item 7.

   b. Rental Rate - Rental rates for equipment will be paid on an hourly basis for each hour the equipment is used, in accordance with the following formula:

$$\text{Hourly Rate} = \frac{[(MR+AT) \times RA \times RF]}{176 \text{ hours/month}} + OC$$

Where:

MR	=	Blue Book Monthly Base Rate
AT	=	Blue Book Monthly Attachment Rate
RA	=	Blue Book Rate Adjustment Factor
RF	=	Blue Book Regional Adjustment Factor
OC	=	Blue Book Operating Costs

Five percent will be added to the above established hourly rate.

Limitations: The attachment rate will be included in the rental rate only when deemed applicable and essential to the Force Account work ordered by the Engineer. When multiple attachments are approved for use and the attachments are being used interchangeably on the Force Account work, only the one attachment having the higher rate will be eligible for payment.

Shop tools: Rental will not be allowed for equipment listed in Section 18 - Shop Tools of the Blue Book, having a listed daily rate of less than $10.

c. Standby Rate - When ordered by the Engineer, standby time shall be paid in accordance with the following formula:

$$\text{Hourly Rate} = \frac{[(MR+AT) \times RA \times RF]}{176 \text{ hours/month}} \times \frac{1}{2}$$

Limitations: Operating costs for equipment will not be included in the standby rate.

No more than eight hours of standby time will be paid during a 24-hour period. No more than 40 hours of standby time will be paid during an one-week period.

d. Rental Invoices - If Contractor-owned equipment is not available and equipment is rented from outside sources, payment will be on the basis of actual invoice cost plus 5 percent. The Engineer reserves the right to disallow invoice payment on rates higher than those set forth herein. When the invoice specifies that the rental rate does not include fuel, lubricants, repairs and servicing, an amount equal to 15 percent of the invoice will be added for such items.

e. Owner-Operated Equipment - (Applies Only to Trucks) – Owner-operated equipment shall be paid on the basis of actual invoice costs. It will not be necessary to segregate the labor and equipment costs. Cost of owner-operated equipment will be paid at invoice cost plus 5 percent. The Engineer reserves the right to disallow invoice payment based on rates higher than those set forth herein.

f. Transportation Costs - The rental rates established herein are based on the Contractor having the equipment available on the project site(s) to accomplish the ordered force account work. In the event the required equipment is not on the site and it is necessary to furnish equipment from off-site exclusively for force account work, the cost of transporting the equipment to the work site and returning it will be allowed as an additional item of expense. Cost of transportation by common carrier shall be paid at invoice cost plus 5 percent. Self-propelled equipment, other than trucks, will be paid at a rate equal to 75 percent of the rental rates established herein for transportation.

g. Equipment Condition and Job Conditions - Tthe rental rates established herein are for equipment of modern design which is in good working condition. When equipment is used that does not meet such requirements or is not operated in a manner as to provide normal output or production, the Engineer may disapprove the use of such equipment or allow its use only at an agreed reduced rate. Job conditions that are substantially more severe than average and that would result in conditions substantially increasing "normal wear and tear" may require an upward adjustment of rental rates established herein as agreed to by the Contractor and the Engineer.

h. Unlisted Equipment - In the event proposed equipment to be used on force account work is unlisted, the Contractor and Engineer shall agree on an equitable rental rate.

5. Professional Services. Should the force account work require the use of professional services for surveying, consulting engineers, biologists, etc., for which a contract item is not available, these expenses including reasonable travel/subsistence will be reimbursed at a cost agreed to before the work begins with no additional markup under Parts 1, 2, 3, and 4 above other than an administrative fee calculated as shown herein.

6. Miscellaneous. No additional allowance will be made for the use of small tools, or other costs for which no specific allowance is herein provided.

7. Satisfactory Evidence. No payment will be made for work performed on a force account basis until the Contractor has furnished the Engineer with duplicate itemized statements of the cost of such force account work detailed as follows:

a. Name, classification, dates, daily hours, total hours, labor rate, and extension for each laborer and foreman.

b. Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.

c. Quantities of materials, prices and extensions.

d. Transportation of materials.

e. Cost of payroll burdens, travel and subsistence expenses.

f. Cost of bonding, insurance, and TERO taxes (at the end of the project).

Statements shall be accompanied and supported by receipted invoices for all materials used and transportation charges. However, if materials used on force account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the invoices the Contractor shall furnish an affidavit certifying that such materials were taken from stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost, excluding overhead, to the Contractor.

8. Administrative Expenses. When work on a force account basis is performed by an approved first or lower tier subcontractor, or by owner-operator, an amount based on the following table will be allowed in addition to the percentages in Parts 1, 3, and 4 above, to reimburse the prime Contractor for the administrative expenses incurred in connection with the work. Bid items with a price per unit in the original contract, which are included in Force Account work, are not eligible for administrative expenses.

Agreed Price of first or lower tier subcontractor's work

		Adjustment	Maximum
To	$1,000	(Lump Sum)	$100
Over	$1,000 to $ 10,000	($100 plus 5% of excess over $ 1,000)	$550
Over	$10,000 to $150,000	($550 plus 3% of excess over $10,000)	$4,750
Over	$150,000	(Lump Sum)	$5,000

Approval of this additional amount will be made after receipted invoices are furnished by the Contractor.

Additional markups for overhead and profit, above the percentages in Parts 1, 3, and 4 above, will not be allowed.

Force account work shall be adjusted daily upon duplicate report sheets furnished by the Engineer and signed by both parties, which daily reports shall thereafter be considered the true record of the force account work done.

109.04 Eliminated Items. Should any items contained in the proposal be found unnecessary for the proper completion of the work, the Engineer may, upon written order to the Contractor, eliminate such items from the contract, and such action shall in no way invalidate the contract. The Contractor, when notified of the elimination of items, will be reimbursed for actual work done and costs incurred prior to said notification.

109.05 Partial Payments. Partial payments will be made at least once each month as the work progresses provided the orders of the Engineer have been fulfilled. Bimonthly payment will be made at the contractor's request. Partial payments will be based upon estimates prepared by the Engineer of the value of the work performed and materials complete in place in accordance with the contract and for materials delivered in accordance with Subsection 109.06.

If, at any time, the Engineer shall determine that the work is not progressing as scheduled or satisfactorily, or the Engineer shall deem the state's interests insecure, the Engineer may refuse to make full progress payments and may withhold from any progress payment or payments such sums as may be deemed necessary.

1. Standard Retainment

   The state shall retain 5 percent of each partial payment to be used as provided in Subsection 109.08.

   When not less than 97.5 percent of the work has been completed, the Engineer may, at his or her discretion and with the consent of the surety, prepare an estimate from which will be retained:

   a. an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done; or

b. an amount equal to the contract value for large items of work which are restricted due to seasonal construction limitations.

The remainder for a or b above, less all previous payments and deductions, will then be certified for payment to the Contractor.

2. Discretionary 100 Percent Progress Payments

If desired by the Contractor and at the discretion of the Engineer, partial payment as described above may be made in full without retention of 5 percent of each payment. If the Contractor desires such full 100 percent progress payments, the Contractor shall be obligated to pay upon demand any sums paid in excess of the final estimate under Subsection 109.08.

If the Contractor desires 100 percent progress payments, the Contractor shall furnish specific written consent of the surety thereto and the performance bond shall guarantee repayment to the state of any sums paid to the Contractor as progress payments in excess of the final estimate.

No retainage will be withheld from payment for material on hand.

No interest will be paid on retainage.

The Contractor shall pay each subcontractor for satisfactory performance of its contract no later than 20 calendar days from receipt of each payment the Contractor receives from the Department. The Contractor shall return retainage to each Subcontractor within 20 calendar days after the Subcontractor's work is satisfactorily completed.

The Contractor shall certify with each estimate payment that payment to Subcontractors has been made within the prescribed time frames. The certification will be made on forms provided by the Department, and returned within 20 calendar days of receiving the estimate payment.

These requirements shall also apply to first or lower tier subcontractors.

109.06 Payment for Material on Hand. Partial payments may be made for materials which are to be incorporated in the work, when delivered on the project or stockpiled in approved storage places. The quantity of stockpiled material eligible for

partial payment shall not exceed the total estimated quantity required to complete the project. The value may not exceed the appropriate portion of the value of the contract item or items in which such material is incorporated.

No partial payment will be made on living or perishable plant materials until planted.

109.07 Allowance for Materials Left on Hand. Materials delivered to the project with written order of the Engineer and left unused due to changes in plans or variation in quantities will, if the materials are not practicably returnable for credit, be purchased from the Contractor by the state at actual cost, without any percentage allowance for profit, and shall thereupon become the property of the state. Actual costs will be based on invoice price plus transportation costs to the work. In no case will such cost payment exceed the price per unit bid for the item had the material been used.

The Contractor is cautioned to order materials only after having received approval. Responsibility for excess materials delivered to the project without authority from the Engineer will rest with the Contractor.

At the option of the state, surplus aggregates may be purchased provided:

1. The material is stockpiled where directed, and

2. The material meets specification requirements when stockpiled.

The Contractor will be paid for material accepted on an agreed price basis, which price shall normally be the production cost. In addition, the Contractor will be paid the cost to haul the material to the stockpile site in accordance with the provisions of Subsection 104.03.

109.08 Acceptance and Final Payment. When the project has been accepted as provided in Subsection 105.16, the Engineer will prepare the final estimate of the quantities of the various items of work performed. When the Contractor approves the final estimate, the state will process the estimate for final payment. With approval of such final estimate and with the consent of surety filed with the Engineer, the Contractor will be paid the entire sum found to be due after deducting all previous payments and all amounts to be retained or deducted under the provisions of the contract. The Contractor's approval of the final estimate will not prejudice any pending claims filed in accordance with Subsection 105.17 under the contract. Upon

final adjudication of the claim any additional payment determined to be due the Contractor will be processed for payment.

All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

No interest will be paid on retainage.

SECTION 200 - EARTHWORK

SECTION 201 - CLEARING AND GRUBBING

201.01 Description. This work shall consist of cutting and disposing of all trees, brush, shrubs, logs and windfalls, and removing and disposing of all stumps and related roots, debris, etc., from areas hereinafter designated, in accordance with these specifications.

Areas to be cleared and grubbed will normally be the area described by a line drawn 5 ft. (2m) outside the grading area. Other areas to be cleared and grubbed will be as shown on the plans or as directed.

201.02 Materials. Not Specified.

201.03 Construction Requirements. When shown on the plans or directed, trees within the construction area not requiring removal shall be preserved and protected in an approved manner. Trees or shrubs to be retained, which have been cut or scarred, shall be painted with an asphaltum base paint prepared especially for tree surgery.

Unless otherwise provided, all merchantable timber in the clearing area which has not been removed from the right-of-way prior to the beginning of construction shall become the property of the Contractor.

If perishable material is burned, it shall be done in conformance with applicable laws, ordinances and regulations.

When permitted, materials and debris which cannot be burned and perishable materials may be removed from the right-of-way and disposed of at locations off the project outside the limits of view from the project with the written permission of the property owner on whose property the materials and debris are placed. Copies of all agreements with property owners shall be furnished the Engineer. Compliance with Subsection 107.18 - Cultural Resource Protection will apply to the waste area.

Trees, shrubbery, grass and other vegetative ground cover outside the construction area shall be preserved and protected from damage, and the Contractor will be held responsible for any damage thereto resulting from construction operations. The Contractor shall take reasonable care to avoid damage by construction operations to

streams and lakes adjacent to the road. All vegetation and ground cover not within the construction area, including median areas not required to be graded, shall be preserved and protected as directed.

201.04 Method of Measurement. Clearing and grubbing will be measured by the acre (hectare) or on the lump sum basis. The quantity to be measured when the acre (hectare) basis is used will be the area cleared and grubbed in accordance with stakes set by the Engineer.

201.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Clearing and Grubbing	Acre (ha) or Lump Sum

When the contract does not include an item for clearing and grubbing, this work shall be considered as subsidiary work and the cost thereof included in the contract unit prices for other earthwork items.

SECTION 202 - SELECTIVE REMOVAL OF TREES OR STUMPS

202.01 Description. This work shall consist of the removal and disposal of separate trees (including stumps) or stumps as shown on the plans or designated in accordance with these specifications.

202.02 Materials. Not Specified.

202.03 Construction Requirements.

A. *Selective Removal of Trees.* This work shall consist of removing designated trees, including their stumps, and disposing of the material as required under Section 201 Clearing and Grubbing.

B. *Selective Removal of Stumps.* This work shall consist of the excavation and removal of designated stumps as required under Section 201 - Clearing and Grubbing.

202.04 Method of Measurement. Selective removal of trees, including their stumps, and selective removal of stumps will be measured by the actual units of each removed.

202.05 Basis of Payment. Payment for accepted work will be made as follows:

The removal of trees or stumps, if less than 6 in. (150 mm) in diameter, will not be paid for separately but shall be considered as incidental to the work of excavation. For trees, measurement will be made at a point 2 ft. (600 mm) above the ground line. For stumps, measurement will be made at a point 2 ft. (600 mm) above the ground line or at the top of the stump if it is less than 2 ft. (600 mm) in height.

Pay Item	Pay Unit
Selective Removal of Trees	Each
Selective Removal of Stumps	Each

When the contract does not include an item for selective removal of trees or selective removal of stumps, this work shall be considered as subsidiary work, and the cost thereof shall be included in the contract unit prices for other earthwork items.

SECTION 203 - REMOVAL OF OBSTRUCTIONS

203.01 Description. This work shall consist of the removal, wholly or in part, and satisfactory disposal of all buildings, fences, structures, old pavements, abandoned pipe lines, and any other obstructions which are not designated or permitted to remain, except for the obstructions to be removed and disposed of under other items in the contract. It shall also include the salvaging of designated materials and backfilling the resulting trenches, holes and pits.

203.02 Materials. Not Specified

203.03 Construction Requirements.

A. *General.* The Contractor shall raze, remove, and dispose of all buildings and foundations, structures, fences, and other obstructions, any portions of which are on the right-of-way, except utilities and those for which other provisions have been made for removal. All designated salvageable material shall be removed without unnecessary damage in sections or pieces which may be readily transported, and shall be stored by the Contractor at specified places within the project limits. Unusable material may be disposed of outside the limits of view from the project with written permission of the property owner on whose property the material is placed. Unusable material shall be disposed of in such a manner that no unsightly appearance will result. Copies of all

agreements with property owners are to be furnished the Engineer. Basements or cavities left by structure removal shall be filled to the level of the surrounding ground, and, if within the prism of the construction, shall be compacted in accordance with Subsection 205.03 – E. *Classes of Compaction and Density Requirements.*

Where new construction abuts existing materials the edges of the existing materials shall be sawed to a vertical line, unless otherwise directed.

Environmental and cultural resource protection shall be applicable in accordance with Subsections 107.17 and 107.18.

B. *Removal of Bridges, Culverts, and other Drainage Structures.* Bridges, culverts and other drainage structures in use by traffic shall not be removed until satisfactory arrangements have been made to accommodate traffic.

Unless otherwise directed, the substructures of existing structures shall be removed down to the natural stream bottom and those parts outside of the stream shall be removed down 1 ft. (300 mm) below natural ground surface. Where such portions of existing structures lie wholly or in part within the limits for a new structure, they shall be removed as necessary to accommodate the construction of the proposed structure.

Unless otherwise provided, all salvageable materials shall become the property of the Contractor and shall be removed from the site of the work or otherwise satisfactorily disposed of. All structural steel that has been identified as having a lead based paint shall be removed from the site and delivered to an approved scrap metal recycler. The Contractor shall certify in writing the final disposition of all structural steel with lead based paint.

C. *Disposal of Concrete and Masonry.* Concrete and masonry removed shall be placed in embankments. Any concrete or masonry, which cannot be placed in embankments, shall be disposed of in such manner as to prevent damage to property or the creation of unsightly conditions.

Where old concrete construction abuts new concrete construction, edges of pavement, sidewalks, curbs, etc., to be left in place shall be sawed to a vertical line.

203.04 Method of Measurement. When the contract stipulates that payment will be made for removal of obstructions on a lump sum basis, the pay item, removal of obstructions, will include all structures and obstructions encountered within the right-of-way in accordance with the provisions as set out in this section. Where the contract stipulates that payment will be made for the removal of specific items on a unit basis, measurement will be made by the unit stipulated in the contract.

203.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Removal of Obstructions	Lump Sum
Removal of	Each, ft. (m), SY (m^2)

When the contract does not include an item for removal of obstruction, this work shall be considered as subsidiary work and the costs thereof included in the contract unit prices for other earthwork items.

SECTION 204 - OBLITERATION OF OLD ROAD

204.01 Description. The work shall consist of obliterating, in accordance with these specifications, such portions of abandoned roadways as are indicated on the plans or directed.

204.02 Materials. Not Specified.

204.03 Construction Requirements. When the old road requiring obliteration is no longer needed for traffic, ditches shall be filled and the entire roadway rough graded, scarified, harrowed and bladed to present a pleasing appearance with slopes rounded and flattened to blend naturally with the adjacent topography.

All structures designated on the plans, for the removal of which a price is not included in the contract, shall be broken down, buried, or removed.

If pavement is required to be removed under Obliteration of Old Road, this work shall be done as Removal of Old Pavement as provided under Section 203 - Removal of Obstructions. This work shall include removal of either asphaltic or Portland cement concrete pavement down to unbound base or sub-base material and disposal of the material at an approved location. If a quantity is not provided for Removal of Old

Pavement, the work shall be considered as incidental and the cost included in the bid price for Obliteration of Old Road.

204.04 Method of Measurement. Obliteration of old road will be measured by the foot (meter) along the centerline of the road obliterated outside the excavation or embankment limits of the new construction.

204.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Obliteration of Old Road	ft. (m)

SECTION 205 - EXCAVATION AND EMBANKMENT

205.01 Description. This work shall consist of excavation, disposal, or compaction of all material not being removed under some other item, which is encountered within the limits of the work necessary for the construction of the roadway in accordance with the specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or as established.

This work shall include the removal and disposal of structures or any miscellaneous obstructions which are visible or are indicated on the plans which encroach upon or otherwise obstruct the work and for which no separate bid item is provided.

A. *Excavation.* Excavation shall include all excavation performed under this item regardless of the material encountered. Excavation may be divided into appropriate schedules. The excavation volume in each section will then be identified as “Excavation, Schedule No. 1,” or “Excavation, Schedule No. 2,” etc., as shown on the plans.

B. *Controlled Blasting.* Controlled blasting shall consist of drilling and shooting a series of line holes for controlling the neat line of the backslope along the excavation line of the roadway prism.

Controlled blasting shall be required in the excavation of rock or cemented materials where cutslopes, shown on the plans, are steeper than 3/4 horizontal to 1 vertical (3/4:1). This provision shall apply even if the main excavation can be ripped.

1. *Blasting Techniques*

   a. *Presplitting.* Presplitting involves drilling a single row of the line holes along the neat excavation line of the slope; they should be properly loaded to minimize over break, and fired simultaneously in advance of the production round blasting. Line holes for presplitting may be fired independently or simultaneously with the production round wherein suitable millisecond delays are used in the production round blasting.

   b. *Cushion Blasting.* Cushion blasting involves leaving in place an undisturbed buffer section approximately 10 ft. (3m) thick, between the neat excavation line of the slope and the production round blasting or ripping. After removal of the materials composing the production zone, the undisturbed section shall then be trimmed off the slope by firing simultaneously a single row of line holes drilled on the neat excavation line.

2. *Controlled Blasting Provisions*

   Line holes for controlled blasting shall be a minimum of 2 in. (50 mm) and a maximum of 3 in. (75 mm) in diameter. They shall be loaded with sufficient explosives to effect clean splitting of the materials between adjacent drill holes and a minimum of shattering or overbreak. Maximum depth of each lift shall be no more than 40 ft. (12 m), slope measurement. The explosive charges shall consist of properly spaced cartridges, securely fastened to detonating cord and the holes shall be completely stemmed with free flowing sand or other approved materials.

   A short test line of holes shall be presplit or cushion blasted as changes in conditions warrant to determine the loading, spacing, and depth or lift required to obtain the desired result. Drill hole spacing shall be as nearly parallel one to another as possible.

   If drill holes do not remain open full depth or deviate more than 1 ft. (300 mm) from a line formed by the intersection of the plane of the staked slope and a vertical perpendicular plane through the collar of a slope drill hole, the depth of lift shall be reduced until an open hole can be maintained or the deviation can be controlled within the 1 ft. (300 mm) tolerance.

Successive sets of line holes may have their collars offset up to 1 ft. (300 mm) but shall be so inclined that all sets closely approximate the staked slopes.

The use of lifters or springing of line holes will not be permitted.

The end result of these specifications is intended to produce a cut face sheared along the staked slope line with a minimum of overbreak and little or no material shattered or loosened back of the finished slope. The amount and type of explosives, methods of loading, delay patterns, and other features not otherwise specified, shall meet the above requirements.

The Contractor shall furnish to the Engineer prior to drilling, a blast plan showing pattern and depth of drill hole, type and amount of explosives used, loading pattern, and sequence of firing.

C. *Cutslope Finishing.* Where rock is encountered which can be readily ripped, the cutslope shall be constructed with a stair-step conformation which will encourage vegetative growth. The dimensions of the steps or terraces, unless otherwise provided, will be determined in the field. The terraces should approximately follow contour lines.

Cut or excavated slopes 2:1 or steeper shall be constructed with stair-step or serrated conformation (terraces or benches) which will encourage vegetative growth. The steps or serrations shall have approximately 1-2 feet (300-600 mm) vertical dimension with horizontal dimensions to fit the slope. Serrations shall follow approximate contour lines. Steps or serrations should not be constructed on slopes containing soil types that are sandy, rocky, noncohesive or highly erodible, or in soft-rock laminations.

Loosened or shattered rocks that will not remain in their natural position shall be removed from the slopes.

D. *Borrow.* Borrow shall be obtained from designated or approved sources.

Glass may be incorporated into a uniform composite material for use as borrow, as follows:

Whole glass bottles may be used up to approximately 20% by volume of borrow material when placed at least 5 ft. (1.5 m) below finished grade, under the paved surface and a minimum of 2 ft. (600 mm) in from the edge of pavement.

Glass crushed to 3/4 in. (19 mm) minus may be used up to approximately 30% by volume in borrow when placed at least 1 ft. (300 mm) below unpaved surfaces.

Whole bottles or crushed glass may be mixed on the grade.

E. *Granular Borrow.* Granular borrow shall consist of sand, sand-gravel, and sand and rock mixtures, and shall be obtained from designated or approved sources. Material selected shall have a sand equivalent greater than 30.

Glass crushed to 3/4 in. (19 mm) minus may be used up to approximately 30% by volume in granular borrow when placed at least 1 ft. (300 mm) below unpaved surfaces.

Crushed glass used in granular borrow may be mixed on the grade to provide a uniform composite material.

205.02 Materials.

Material shall meet the following:

Dust Oil 711.13

205.03 Construction Requirements.

A. *General.* The Contractor shall not proceed beyond the dimensions and elevations established, and no material shall be removed prior to the staking out and cross sectioning of the site. When necessary to remove fencing, the fencing shall be replaced in as good condition as it was originally and shall conform to Subsection 107.19. The Contractor shall be responsible for the confinement of livestock when a portion of the fence is removed.

Material shall not be wasted without permission. The excavation and borrow operations shall be so scheduled that no unauthorized waste of excavation will result.

Cultural resources shall be protected in accordance with the provisions of Subsection 107.18.

The Engineer may designate as unsuitable materials that cannot be properly compacted in embankments. All unsuitable material shall be disposed of as directed. It shall be the responsibility of the Contractor to furnish an approved site for the disposal of excess or unsuitable materials. Disposal of bituminous material shall comply with the requirements of 107.17. No separate payment will be made for the acquisition or operation of the site.

Where excavation to subgrade exposes soft spots they shall be repaired by one of the following methods:.

1. If the Engineer determines the material is unsuitable, then the contractor shall remove and dispose of the material.
2. If the material is suitable for construction purposes, except for excessive moisture content, the soft spots shall be repaired.

Soft spot repair shall restore the subgrade so as to meet the compaction and density requirements as outlined in Subsection 205.03-E Classes of Compaction and Density Requirements. Class A Compaction. Repair shall consist of excavation, drying, replacement, and compaction of the in-place soils or, at the Contractor's option, approved material may be substituted for in-place soils at no additional cost to the state. The limits of areas included in soft spot repair shall be determined by the Engineer.

The roadway shall be maintained in such condition that it will be well drained at all times.

Erodible surfaces of cut and embankment slopes shall be protected by measures outlined in Section 212 - Erosion and Sediment Control.

Areas excavated below subgrade shall be backfilled to subgrade with granular material or with base or surfacing material as required.

Overbreak, consisting of rocks shattered or loosened outside the staked lines of cutslopes by the Contractor's operation, that will not remain in its natural position, or if remaining, constitutes a hazard to traffic, shall be removed and disposed of as directed.

Material originating outside the staked lines of cutslopes which slides into the roadway due to causes beyond the control of the Contractor, shall be removed and disposed of and the cutslopes refinished as directed.

B. *Embankment Construction.* No embankment material shall be placed until the foundation has been approved. Frozen material, other than rock, shall not be placed in embankments. Embankments shall not be constructed on snow covered or frozen foundations, or other such surfaces within the embankment structure.

All embankments constructed on slopes steeper than 5 horizontal to 1 vertical shall be keyed into the preexisting slope with horizontal benches that have a vertical face approximately 5 ft. (1.5 m) in height. Each bench shall be sloped to drain. Material excavated from the benches may be incorporated in the embankment or wasted as directed.

Any seepage encountered shall be drained from the embankment as shown on the plans or as directed.

Across swampy ground, the first lift of the embankment shall be constructed by end-dumping. The thickness of this lift shall provide a stable surface. The remainder of the embankment shall be constructed in layers as specified.

Embankment material containing excessive moisture shall be allowed to dry to a moisture content that will permit the required compaction.

Embankments constructed of material that can be tested by AASHTO T -310, Method B, shall be placed in layers not to exceed 8 in. (200 mm) loose thickness. Each layer shall be uniformly compacted at an approved uniform moisture content to the requirements of the class of compaction shown in the Special Provisions or the plans.

Embankments constructed of material too granular to test by AASHTO T -310, Method B, shall be constructed in horizontal layers no thicker than 18 in. (500 mm) unless the largest rock is greater than 18 in. (500 mm). No layer shall be thicker than 3 ft. (1 m) unless otherwise permitted. Large rock shall be distributed so the voids between them are filled with smaller rock and/or earth. Adequate water to facilitate compaction shall be provided.

Each layer placed more than 18 in. (500 mm) below subgrade shall be uniformly compacted with a minimum of three full coverages for each 6 in. (150 mm) of lift thickness or fraction thereof with rollers of the following minimum requirements:

1. Vibratory rollers having a rated dynamic force of 30,000 lb. (13 600 kg) per impact and at least 1000 vibrations per minute.

2. Grid rollers having a static weight of at least 20,000 lb. (9000 kg) and 4,000 lb./ft. (6000 kg/m) of drum width.

Rolling requirements may be reduced one coverage per 6 in. (150 mm), or fraction thereof, for each increase of 5,000 lb. (2300 kg) per impact for vibratory rollers or 1,000 lb./ft. (1500 kg/m) of drum width for grid rollers.

In no case will less than one complete coverage for each 6 in. (150 mm) of lift thickness be allowed.

Rock material placed within 18 in. (500 mm) of subgrade and rock backfill of overexcavated areas in rock cuts shall be constructed in layers not exceeding 9 in. (230 mm) thick, unless directed otherwise. Each layer shall be uniformly compacted with a minimum of 12 full coverages of a vibratory roller meeting the minimum requirements previously stated. Vibratory rolling may be reduced one full coverage for each increase of 5,000 lb. (2300 kg) per impact above the minimum. In no case will less than 6 full coverages per 9 in. (230 mm) lift, or fraction thereof, be allowed.

The Contractor shall limit the speed of grid rollers to no more than 4 mph (7 km/h) and the speed of vibratory rollers to no more than 1.5 mph (2.5 km/h).

All work as described in this Subsection is considered incidental. No separate payment will be made for any work performed under this Subsection. Cost shall be included under other earthwork items.

C. *Process Old Road.* Scarify the old road to full depth and spread to form a uniform foundation when the old road surfacing is within 5 ft. (1.5 m) of the proposed finished grade and below subgrade.

D. *Density Determination.* The standard density shall be determined in accordance with the following applicable standard methods:

Moisture-Density Relations of Soils .....AASHTO T 99
Method A or C

Correction for Coarse Particles in the Soil
Compaction Test .....AASHTO T 224

Family of Curves – One point Method .....AASHTO T 272

Compaction Standard for Coarse Granular Materials
by Use of the Vibratory Spring-Load Compactor .....Idaho T-74

In lieu of Idaho T-74, the Engineer may determine the standard density of coarse granular material in accordance with the following standard method:

Moisture-Density Relations of Soils .....ASHTO T 180
Method D

Determination of in-place density and percent compaction of standard density shall be by the following standard methods:

In Place Density and Moisture Content of Soil and Soil-Aggregate
by Nuclear Methods (Shallow Depth) .....AASHTO T 310
Method B

A block of concrete weighing a minimum of 75 lb. (34 kg) and well seated on a compacted base may be substituted for the compaction base specified in AASHTO T -99.

The applicable standard method will be determined according to the following table:

MATERIAL AT OR BELOW SUBGRADE:

AASHTO T-99 Method A	AASHTO T-99 Method C OR Idaho T-74 (2)	IDAHO T-74(2)	TOO GRANULAR TO TEST
≤10% retained on No.4 (4.75 mm).	>10% retained on No.4 (4.75 mm) and <30% retained on 3/4 in. (19mm) (1).	≥30% retained on 3/4 in. (19mm) and <10% retained on 3 in. (75 mm).	>30% retained on 3/4 in. (19mm). Document equipment and compaction effort(3).
			≥10% retained on 3 in. (75 mm) using 65 lb. (30 kg) sample. Document equipment and compaction effort(4).

(1) >10% retained on 3/4 in. (19mm) use AASHTO T-224.

(2) Clean gravel material at or below subgrade & Granular Borrow, both with Sand Equivalent ≥30. Where applicable AASHTO T-180 Method D may be used in lieu of Idaho T-74.

(3) Application to soil / rock mixtures with Sand Equivalent < 30. A gradation and Sand Equivalent to verify "Too Granular to Test" will be performed and recorded on the ITD-850 at the same frequency, as a density test would have been performed.

(4) Applicable to all materials regardless of density standard. A gradation test to verify "Too Granular to Test" will be performed and recorded on the ITD-850 at the same frequency as a density test would have been performed.

< Less than
≤ Less than or equal to
> Greater than
≥ Greater than or equal to

E. *Classes of Compaction and Density Requirements.* Compaction of embankments including backfill and embankment foundations shall meet the requirements of one of the following classes as specified in the contract.

If the class of compaction is not specified, Class B compaction will be required.

1. *Class A Compaction.* Class A compaction shall consist of compacting the top 12 in. (300 mm) of embankment and backfill material and the top 8 in. (200 mm) in cuts to the following requirements: For materials having a maximum dry density of 120 lb./CF (1900 kg/m^3) or less, 95 percent of standard density; uncorrected before applying AASHTO T 224. Embankment and backfill material within slopes extending outward from the finished subgrade shoulder and placed more than 12 in. (300 mm) below sub grade shall be compacted to 95 percent of standard density. When practicable embankment and backfill material placed outside an approximate 2:1 slope for interstate or primary and on an approximate 1 1/2:1 slope for secondary projects shall be given Class D compaction.

2. *Class B Compaction.* Class B compaction shall consist of compacting embankment and backfill material within 12 in. (300 mm) of subgrade to the density standards for class A compaction. Other material below subgrade shall be compacted by routing all construction equipment uniformly over the entire surface of each layer. Additional rolling may be directed if routing of equipment is unsatisfactorily performed.

3. *Class C Compaction.* Class C compaction shall consist of compacting of selected areas under embankments to the density standards for Class A compaction to a depth of 8 in. (200 mm). The station limits of Class C compaction will be as shown on the plans or as directed. The width will be between subgrade shoulders.

4. *Class D Compaction.* Class D compaction shall consist of compacting the median embankments and slope flattening. The compaction shall consist of not less than one complete coverage with approved track-type or rubber-tired earthmoving equipment. The embankment shall be placed in lifts not to exceed 12 in. (300 mm) in depth of material before compaction. The fill material must be moist.

Materials above subgrade which do not have a specified compaction requirement shall be compacted to not less than 95 percent of the standard density in accordance with Idaho T-74, or AASHTO T 180.

If material is too granular to test according to the table in 205.03, Part D, it shall be placed in layers not to exceed 9 in. (230 mm) and compacted with a minimum of 12 full coverages of a vibratory roller. Vibratory rollers shall be rated by minimum

dynamic force of 30,000 lb. (13, 600 kg) per impact and at least 1000 vibrations per minute. Vibratory rolling may be reduced one full coverage for each increase of 5,000 lb. (2300 kg) per impact above the minimum. In no case will less than 6 full coverages per 9 in. (230 mm) lift, or fraction thereof, be allowed.

F. *Dust Oil.*

The surface to be treated shall be shaped and completed to a uniform cross section which will drain. Dust oil shall be applied when the surface is dry or slightly damp by means of a pressure distributor.

The application rate shall be as directed.

205.04 Method of Measurement. Excavation, borrow, excavation of soft spots, soft spot repair and granular borrow will be measured by the cubic yard (cubic meter) in its original position from field survey or photogrammetric cross sections, using the average end area method with no correction for curvature, or by the ton (metric ton).

Where it is impractical to measure material by either the average end area method or in its original position, alternate practical methods with appropriate adjustments may be used. The total will not include the volume of any material which is used for purposes other than those directed. No payment will be made for rock excavation made below subgrade elevations unless such excavation is required by the plans or directed. No allowance will be made for borrow replaced by unauthorized rock excavation below subgrade.

Channel change excavation shall include only that excavation necessary to construct the channel or ditch from established bank elevation to flow line grade. Earthwork necessary to construct the cut or fill to bank elevation will be included in the roadway quantities. Overbreak will not be included in the measurement of excavation.

Class C compaction and the processing of old road surfacing will be measured by the unit. A unit is 1000 SY (a metric unit is 1000 square meters).

Water ordered for dust abatement will be measured by the MG (cubic meter). (1 MG = 1000 gals.) by means of calibrated tanks or distributors or by means of accurate water meters.

Dust oil ordered will be measured by the gallon (liter).

Controlled blasting will be measured by the foot (meter) of line holes drilled whether loaded or not.

205.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Excavation	CY (m^3)
Excavation Schedule No.	CY (m^3)
Controlled Blasting	ft. (m)
Channel Change Excavation	CY (m^3)
Borrow	CY or Ton (m^3 or t)
Granular Borrow	CY or Ton (m^3 or t)
Class C Compaction	Unit (m^2)
Process Old Road	Unit (m^2)
Water for Dust Abatement	MG (m^3)
Dust Oil	gal. (L)
Excavation of Soft Spots	CY (m^3)
Soft Spot Repair	CY (m^3)

Overbreak will not be paid for.

Removal and disposal of unsuitable material from below subgrade shall be paid under excavation of soft spots. Any backfill material used to replace subgrade excavation shall be paid under its respective item or as extra work.

Soft spot repair shall include excavation, drying, replacement, and compaction of the in-place soil; or with approval, Contractor's optional replacement and compaction.

Backfill will be paid for at the contract price for the item used.

Removal of slides and associated work will be paid for at the contract unit price for excavation existing where the slide occurred or as extra work in accordance with Subsection 104.03.

Any water or dust oil which the Engineer orders the Contractor to apply for the purpose of controlling dust for safety and comfort of the traveling public; for the health and comfort of people residing near the project; to protect crops from possible damage from dust or which is applied in the public interest, will be paid for as Water for Dust Abatement or Dust Oil.

Excavation which must be stockpiled or stored prior to final placement, including topsoil, will be paid for at the contract unit price for each handling approved by the Engineer, unless paid for as another item of work for the second handling.

No separate payment will be made for glass used in borrow or granular borrow.

SECTION 206 - HAUL

206.01 Description. This work shall consist of the authorized hauling of excavated material beyond the specified free haul distance. The free haul distance for excavation shall be 2,000 ft. (1 km). No free haul will be required for borrow or granular borrow.

Haul shall apply to excavation, borrow and granular borrow.

206.02 Materials. Not Specified.

206.03 Construction Requirements. Not Specified.

206.04 Method of Measurement. Haul will be measured as follows:

1. By the yard unit, YU, which is defined as 10 CY of material hauled 1000 ft. (m^3•km, which is defined as 1 m^3 of material hauled 1 km).

2. By the ton unit, TU, which is defined as 10 tons of material hauled 1000 ft. (t•km, which is defined as 1 t of material hauled 1 km).

For material obtained from excavation, two points 2,000 ft. (1 km) apart shall be determined, one on each side of the neutral grade point as indicated on the final construction haul diagram, and so located that the included quantities of excavation and the included quantities of embankment as measured by the method of average end areas shall balance. The distance between the center of volume of the remaining excavation and the center of volume of the resulting embankment less 2,000 ft. (1 km) shall be the length of haul. The length of haul multiplied by the quantities hauled in excess of the free haul distance and included in the accepted pay quantities converted to the nearest whole haul unit, shall be the pay quantity of haul. Haul quantities will be computed from a haul diagram prepared by the Engineer. Analytical methods may be used for computing haul in lieu of the haul diagram described herein.

For borrow and granular borrow, the length of haul shall be the distance between the center of volume of the source and the center of volume of the deposited material, measured along the shortest practicable route as determined by the Engineer, with no deduction for free haul. The length of haul multiplied by the quantities hauled and included in the accepted pay quantities converted to the nearest whole haul unit, shall be the pay quantity of haul.

206.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Haul	YU or TU (m^3•km or t•km)

In case the Contractor, for personal convenience, elects to use a source or a haul plan differing from that proposed in the contract, the actual haul resulting from use of the Contractor's source or haul plan will be paid for, except that haul in excess of that which would have resulted from use of the contract proposal will not be allowed.

When there is no separate contract item in the proposal for haul, its cost shall be included in the amount bid for the contract item to which it applies.

In case no contract price for haul has been established in the contract and changes from the plans cause an increase in the necessary haul, increased haul costs will be paid for as extra work.

SECTION 207 - STRIPPING MATERIAL DEPOSITS

207.01 Description. This work shall consist of stripping earth overburden and other unsuitable material from material deposits in accordance with the specifications and in reasonably close conformity with the plans. Topsoil shall be kept in separate stockpiles from other stripped materials.

207.02 Materials. Not Specified

207.03 Construction Requirements. Stripping of overburden from material deposits shall be done in accordance with the requirements of Subsection 106.10, or as directed. Stripping of overburden from alternate material deposits approved as provided for in Subsection 106.09(2) will not be paid for. Stripping costs plus all other costs of developing alternate material deposits shall be borne by the Contractor.

207.04 Method of Measurement. Material stripped from material deposits will be measured by the cubic yard (cubic meter) in its original position or in approved stockpiles, using the average end area method. Measurement for stripping material deposits shall include the topsoil to be stockpiled for use in source reclamation.

207.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Stripping Material Deposits	CY (m^3)

When the contract does not include an item for stripping material deposits, the cost shall be included in the price of items removed from the source.

SECTION 208 - INTERCEPTOR DITCHES

208.01 Description. This work shall consist of the construction of interceptor ditches in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or established.

208.02 Materials. Not Specified.

208.03 Construction Requirements. Interceptor ditches shall be constructed as shown on the plans or directed.

208.04 Method of Measurement. Interceptor ditches will be measured by the station (meter) along the centerline and profile of the completed ditch.

208.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Interceptor Ditches	Sta. (m)

SECTION 209 - SMALL DITCHES

209.01 Description This work shall consist of constructing small ditches involving an average of less than 0.2 CY per foot (0.5 m^3 per meter) of ditch in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or established.

209.02 Materials. Not Specified.

209.03 Construction Requirements. Small ditches shall be constructed according to the typical section shown on the plans. If no typical section is shown, small ditches shall be constructed by side casting the excavated material.

The Contractor shall conduct the work in such a manner as to cause the least possible interruption in the flow of irrigation water, and shall make suitable arrangements with users of irrigation water so that no claims for damage to crops or interruption to farming operations will result.

Where it is necessary to construct ditches across low ground, dikes shall first be constructed in reasonably close conformity to the line, grade and typical section shown on the plans or directed. Dikes shall be composed of approved impervious material placed in horizontal layers and compacted to 90 percent density as determined in Subsection 205.03. A small ditch shall then be constructed in the top of the dike. Irrigation water, if available, shall be turned into dike ditches for test and approval before acceptance.

209.04 Method of Measurement. Small ditches will be measured by the foot (meter) along the centerline and profile of the completed ditch.

209.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Small Ditches	ft. (m)

Dikes and cuts constructed to carry small ditches will be measured and paid for on the cubic yard (cubic meter) basis of the material excavated, as provided in Section 205, Excavation and Embankment.

SECTION 210 - STRUCTURE EXCAVATION AND COMPACTING BACKFILL

210.01 Description. Structure excavation shall include the work of excavation and disposal of all materials required for the construction of structures and unless otherwise specified shall include all necessary drainage, pumping, bailing, sheeting, shoring; the construction of cribs and cofferdams and their subsequent removal;

removing old structures or parts thereof as required. Compacting backfill shall include the work of placing backfill material, compacting, sloping and cleaning up the sites.

The contract shall provide separate bids to be taken on "Structure Excavation, Schedule No. 1," which shall include excavation for bridges, box and stiffleg culverts, and "Structure Excavation, Schedule No. 2," which shall include excavation for all other structures.

210.02 Materials. Unless otherwise specified, material for backfill will be tested in accordance with AASHTO T 310, Method B , excluding too granular to test.

210.03 Construction Requirements.

A. *General*. Unstable foundation material shall be removed as directed below the designed elevation. Suitable surplus excavated material shall be used in the construction of embankments, and unsuitable material shall be wasted. Material removed below design elevation shall be replaced with approved material.

Trenches shall be sheeted and braced if necessary. Such sheeting shall not be removed until backfill has progressed to such a stage that no damage to pipe lines or structures will result from its removal.

Unless otherwise indicated in the plans or directed, all sheeting and bracing used in making structure excavation shall be removed by the Contractor.

Where rock, hardpan, or other unyielding material is encountered, and a yielding material is required as indicated by the contract, the unyielding material shall be removed below the design grade and backfilled, as directed.

No structure shall be placed until the foundation has been approved.

Unless otherwise specified, all backfill shall consist of suitable materials uniformly distributed in layers of not more than 8 in. (200 mm) and compacted to the density standards for Class A compaction in Subsection 205.03, Part E, Classes of Compaction and Density Requirements, before successive layers are placed.

Backfill placed in areas not within a roadway prism or special backfill placed around pipe underdrains and not requiring a higher degree of compaction for some other purpose should be compacted to approximately the same density

as the adjacent undisturbed soil or gravel. Compaction may be obtained by any effective means the Contractor may choose.

B. *Conduit and Structural Plate Arch*. Pipe culverts and other conduits shall be backfilled first with approved material and carefully hand tamped under the lower one-fourth of the overall diameter, then compacted for the balance of the height and for the specified amount of cover to be placed over the pipe.

C. *Structures*. Solid rock excavation below the established footing elevation shall be filled with Class 15 (Class 10.5) concrete for bridge and box culvert foundations.

Where the footing is to rest on material other than rock or boulders, special care shall be taken not to destroy its bearing value. Disturbed material shall be removed from the excavation and the footing excavation backfilled to the plan elevation with approved material.

Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of any portion of the concrete materials being carried away. No pumping will be permitted during the placing of concrete or for a period of at least 24 hours thereafter, unless it is done from a suitable sump or well point separated from the concrete work.

Backfill placed through water around abutments, wing walls and piers shall consist of suitable material placed in layers. Compaction of the backfill will not be required.

No backfill shall be placed against newly constructed masonry or concrete structures without fulfilling the requirements in the chart titled: Form and Falsework Removal and Loading of Concrete, Subsection 502.03, Part E, Falsework and Forms.

210.04 Method of Measurement. Structure excavation will be measured by the cubic yard (cubic meter) of material in its original position, using the average end area method. The volume of material actually removed shall be measured within a prism with limiting planes as follows:

1. *Conduit and Structural Plate Pipe:* As shown on the plans.

2. *Other Structures:*

   a. The bottom of the foundation.
   b. The vertical planes 2 ft. (600 mm) outside of and parallel to the outside lines of the structure, in the case of bents with individual column footings, the entire bent shall be considered as one structure.
   c. With upper limits as follows:

      (1) In embankment sections, the existing ground surface as cross sectioned.

      (2) In roadway cut sections or channel changes, the planes of the roadway cut or channel change as excavated.

Compacting backfill will be measured by the cubic yard (cubic meter) of backfill material placed. The volume will be determined as follows:

1. *Conduit:* As shown on the plans.

2. *Other Structures:*

   a. Below the original ground surface: A volume equal to the volume of structure excavation less the volume of the permanent structure including opening, contained within the limits of measurement for structure excavation.

   b. Above the original ground surface: The volume contained between the outside walls of the structure and vertical planes 4 ft. (1.2 m) outside thereof; the original ground surface; and a horizontal plane 1 ft. (300 mm) above the top of the structure or of the subgrade, whichever is the lesser.

   c. Volumes of backfill placed through water around abutments, wing walls and piers, will not be included in the measurement of quantities for compacting backfill.

210.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Structure Excavation Schedule No.	CY (m^3)
Compacting Backfill	CY (m^3)

When the contract does not include an item for structure excavation or compacting backfill, this work shall be considered as subsidiary work and the cost thereof included in the contract unit prices for other earthwork items.

Any backfill material or bedding material required whose source is other than structure excavation will be paid for at the contract unit price for the material being used, or as extra work if no unit price has been established.

If the Contractor is directed to remove material below the designed elevation, the excavation will be paid for at the contract unit price or as extra work.

Class 15 (Class 10.5) concrete used to backfill rock excavation below the bottom of the design footing grade will be paid for on the actual quantity used, but not to exceed a prism 1 ft. (300 mm) outside the footing neat lines and an average of 1 ft. (300 mm) depth below the bottom of footing.

No payment will be made to excavate, backfill, and compact material removed for safety purposes.

SECTION 211 - SOURCE RECLAMATION

211.01 Description. This work shall consist of reclaiming land used for borrowing material or mining for aggregates in accordance with an approved plan. "The work shall consist of salvaging and replacing the top 1 ft. (300 mm) of topsoil (or the depth shown on the plans); grading, sloping, and warping source banks and floor; seeding, fertilizing, and mulching; and any other work required by the reclamation plan and/or the Special Provision."

211.02 Materials. Not Specified.

211.03 Construction Requirements. When all usable material has been removed from the source, the slopes and floor shall be graded and contoured to a pleasing, natural appearing conformation; the topsoil replaced; and the area seeded in accordance with applicable provisions of Section 621 - Seeding.

211.04 Method of Measurement. Source reclamation will be measured by the lump sum for each source involved.

211.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Source Reclamation	Lump Sum

When the contract does not include an item for source reclamation, the cost for this work shall be included in the price bid for the material involved.

Should the Contractor receive approval to use an alternate source of material, all cost associated with the reclamation requirements of the alternate source shall be the responsibility of the Contractor.

Seed will be furnished by the state to the Contractor at no cost for designated sources only.

SECTION 212 - EROSION AND SEDIMENT CONTROL

212.01 Description. This work shall consist of furnishing, installing, and maintaining temporary and permanent measures that limit soil erosion, limit sediment transport, and manage runoff; in accordance with the plans, ITD's Erosion and Sediment Control Manual, required permits, and as directed. These measures may consist of seeding, erosion blanket, slope drains, check dams, straw bale barriers, sediment traps, ditches, berms, swales, or other control devices and methods used for controlling erosion and for storm water management.

212.02 Materials. Materials shall meet the requirements specified in the following Subsections:

Seeding	621.02
Metal Apron	708.21
Pipe	708.21
Riprap	711.04
Gabion and Revet Mattress	715
Geotextile	640 & 718

All other materials shall meet commercial grade standards and shall be approved before being used.

212.03 Construction Requirements. At the preconstruction conference or prior to the start of the applicable construction the Contractor shall submit for approval a plan and schedule for installing temporary and permanent erosion and sediment

control measures. This schedule shall cover all ground disturbing activities including haul roads, material pits, staging areas, and excess material sites. No work shall proceed on these activities until approval is granted in writing.

Permanent erosion and sediment control measures shall be incorporated into the project at the earliest practicable time as outlined in the approved schedule.

Temporary erosion and sediment control measures shall be coordinated with permanent control measures where practical to assure economical, effective, continuous control throughout construction and post-construction periods.

Temporary erosion and sediment control measures consist of measures that are not permanent design features of the project. These measures may require replacement or reinstalling one or more times throughout construction of the project. These measures shall be removed as directed or when no longer required.

Permanent erosion and sediment control measures consist of measures that are permanent design features of the project. These measures shall remain in place after construction of the project.

Work shall not start until erosion and sediment control schedule and methods of operations for the applicable construction have been approved.

Perimeter sediment control measures shall be in place for an area to be worked prior to starting other ground disturbing activities. The surface area of disturbed erodible material shall not exceed 5 acres (2 ha) without installation of erosion and sediment control methods unless otherwise approved in writing. This amount may be decreased by the Engineer as determined by an analysis of site conditions or if the Contractor fails to apply control measures in accordance with the approved schedule.

All slopes shall be constructed no more than 15 ft. (5 m) vertically, regardless of slope angle, before installation of erosion control measures. Erosion control measures shall be installed on all cut and embankment slopes with an erodible surface, regardless of size, within 5 calendar days. The Engineer may extended to this time period 5 additional calendar days during the seasonal dry period of June 15 to October 15 when NOAA (National Weather Service) forecasts indicate there is little chance of precipitation.

Erosion and sediment control measures to prevent runoff water from draining down the slope of either a cut or embankment shall be incorporated as part of the daily construction operation.

Temporary erosion and sediment control measures shall be located where shown on the plans or as directed at the earliest practicable time. These control measures may be required between successive construction stages and should be included as part of the normal construction activity.

All erodible surfaces and control measures installed shall be inspected and maintained for functionality on a weekly basis and after each storm producing a flowing water event. Inspection and maintenance of control measures shall be overseen by an individual qualified in erosion and sediment control measures. Control measures may require the removal of sediments during maintenance operations. Any sediments removed may be used on the project as approved but shall be disposed of in a manner as to neither impede the function of control measures nor cause water pollution.

TEMPORARY CONTROL MEASURES

A. *Seeding, Erosion Blanket and Mulching.* Slopes and other ground disturbed areas prescribed for seeding are to be seeded as early as possible. It is not necessary for slopes to be completely constructed prior to seeding a finished portion of the slope.

   Seeding shall be in accordance with Section 621, Seeding except that seeding is allowed outside the designated season(s). Seeded areas that do not produce established vegetation shall be reseeded during the designated season(s). Unless otherwise provided, seed will be furnished by the State at no cost.

   Installing erosion blanket or placing mulch, anchored mechanically or with a tackifier, are methods to protect erodible earthen material. Application shall be in accordance with Subsection 621.03, Part E - *Mulch, Mulch Anchoring, and Erosion Blanket.*

B. *Slope Drains.* A slope drain conveys concentrated runoff water down a slope by use of a plastic liner or pipe material placed upon the ground.

Plastic liner shall be of sufficient width to convey the expected amount of runoff water without overlapping of liner material. Any overlapping along the length of the plastic liner shall be in an approved manner as to prevent runoff water from flowing under the liner. The lengthwise edges of the plastic liner shall be anchored in an approved manner as to prevent runoff water from flowing onto the unprotected slope or displacing the anchor material. The inlet and outlet ends of the plastic liner shall be buried in an approved manner to prevent runoff water from flowing under the liner.

Pipe material with an inlet apron shall be anchored in an approved manner to prevent displacement.

An earth berm may be constructed at the inlet to direct runoff water into the slope drain.

The discharge area at the outlet of the pipe slope drain shall be protected by use of straw bales, riprap, or other approved methods.

C. *Straw Bales.* Only certified noxious weed-free grain straw bales shall be used. Bales may be used alone or in conjunction with other control measures. Bales should be used only where flow rates are low, 1.06 cfs (30 L/s) or less. Bales shall be installed, except when used as a splash guard for a slope drain, 6 in. (150 mm) into the ground and staked in place with a minimum of two wooden stakes per bale. Bales shall be oriented so binding cords are around the sides rather than along the top and bottom of the bale. Metal stakes may only be used where wooden stakes cannot be installed.

D. *Silt Fence.* Silt fence used along the perimeter of ground disturbed areas shall be installed prior to the ground disturbing activity. Silt fence shall not be used in areas of concentrated runoff water like ditches or canals.

Wire reinforcing fence and silt fence fabric shall be attached securely to the upstream runoff water side of posts with the fabric on the upslope side to create a taut fence. The bottom edge of the fabric shall be buried below ground level.

Where two silt fences join, the end posts of each fence shall be placed inside one another with the fabric and wire reinforcing interlocked on each post, so the fence is overlapped.

E. *Sediment Traps.* A sediment trap is a constructed pond that removes sediment particles, sand size or larger, from runoff water. The drainage area for a sediment trap shall not exceed 4.94 acres (2 ha) of disturbed ground.

The size of the sediment trap shall be as shown in the plans or as directed. The ground at the inlet shall be protected by a plastic liner when directed. The ground at the outlet shall be protected by an erosion control geotextile covered with a layer of rock or sandbags of sufficient size as to not be displaced by the outflow of water.

F. *Diversion Channels and Ditches.* Diversion channels and ditches collect or divert runoff water. They may be used in conjunction with a berm or dike. Diversion channels and ditches shall be constructed at a sufficient width to handle the expected water flow. A plastic liner or erosion control geotextile shall be installed in a manner as to prevent water from flowing under the liner or geotextile.

A diversion ditch is smaller than a diversion channel, involving an average of less than 0.2 CY/ft. (0.5 m^3/m) of ditch.

G. *Dikes and Berms.* A dike is a constructed wall of earthen material that directs or contains runoff water. A dike is commonly used in conjunction with a swale or ditch. The ground along the drainage side of a dike shall be protected by a plastic liner when directed. If a plastic liner is used, any overlaps shall be buried into the dike and uphill slope in a manner to prevent runoff water from flowing under the liner.

A berm is a smaller version of a dike. A berm is used to direct small volumes of runoff water.

H. *Swales.* A swale is a wide shallow ditch to hold or direct runoff water. A swale is commonly used in conjunction with a dike.

I. *Open-Top Culverts.* An open-top culvert drains runoff water from the surface of an unpaved temporary road. The top of the culvert is installed level across the travel surface of the unpaved temporary road at downgrade locations. The culvert may be constructed of lumber, metal, or other approved materials. The culvert diameter and top openings need to be adequately sized to drain the runoff water. The culvert shall be constructed to withstand the traffic traveling on the temporary road.

J. *Waterbars.* A waterbar is a combination berm and ditch constructed across an unpaved temporary road to drain runoff water. The waterbar is angled downgrade across the road. The depth and width of the ditch and height of the berm are to be adequately sized to handle the runoff water.

K. *Rolling Dips.* A rolling dip is a very wide shallow ditch constructed across the surface of an unpaved temporary road to drain runoff water. A rolling dip is located along the downgrade of the unpaved temporary road.

L. *Siltation Berms.* A siltation berm is a constructed wall to contain and direct runoff water. The berm is constructed of graded aggregate covered with plastic liner. The plastic liner shall be overlapped and anchored in a manner to prevent water from flowing underneath.

M. *Stabilized Construction Entrance.* A stabilized construction entrance is used to prevent vehicles and equipment from tracking mud or sediment material onto a paved public road. The stabilized area shall be the same width as the adjoining paved road unless otherwise approved. The stabilized area shall consist of an erosion control geotextile covered with graded aggregate. The aggregate shall be of a size as to not be tracked from the stabilized area.

N. *Inlet Protection.* Inlet protection is a method of passing runoff water through a filtering material prior to water draining into a box inlet. Acceptable filtering materials are graded aggregate or silt fence geotextile.

Graded aggregate may be used as a filtering material by berming the aggregate around the inlet in a manner that runoff water will flow through, without over-topping the berm before draining into the inlet. The aggregate may be enclosed in permeable bags.

Silt fence geotextile is used in a manner similar to silt fence. Silt fence geotextile backed with wire reinforcing fence is securely installed around the inlet box, by use of a wooden frame to create a taut fence. Wire for reinforcing fence shall be a minimum of 14 gage (1.9 mm). The bottom edge of the silt fence geotextile shall be buried below ground level sufficiently to prevent water flowing underneath the geotextile.

O. *Soil Binder.* Soil binder is a mixture applied to erodible earthen material that upon drying forms a film or mat that allows water and air to penetrate but retains

the earth material in place. Soil binder shall be approved prior to use and applied at a rate recommended by the manufacturer.

A method to differentiate between the binder and earth material, by color or tracer material, shall be incorporated during application operations. Binding mixture shall not be applied when wind interferes with placement. When cured, the binder shall not be re-emulsifiable. Binder shall have manufactures' certification that it is nontoxic to plant or animal life and nonstaining to concrete or painted surfaces.

PERMANENT CONTROL MEASURES

A. *Seeding, Erosion Blankets, and Mulching.* Slopes and other ground disturbed areas are to be seeded. It is not necessary for slopes to be completely constructed prior to seeding a finished portion of the slope. Seeding of areas previously seeded may be necessary due to nonestablishment of vegetation.

Seeding shall be in accordance with Section 621, Seeding.

Installing erosion blanket or placing mulch, anchored mechanically or with a tackifier, are methods to protect erodible earthen material. Application shall be in accordance with 621.03, Part E – *Mulch, Mulch Anchoring, and Erosion Blanket.*

B. *Gabion and Revet Mattress.* Gabion and revet mattress baskets shall be assembled and filled with rock upon a prepared foundation.

1. Preparation of Foundation. The foundation shall be firm, smooth, and constructed to the lines and grades shown on the plan or as directed.

   a. Gabion. When soft, yielding material is encountered, the material shall be removed below the foundation grade for a depth of at least 2 ft. (600 mm) or as directed. The width of the foundation shall be at least 6 in. (150 mm) greater than the horizontal dimension of the basket. The excavation below grade shall be backfilled with approved granular material and compacted in layers not to exceed 6 in. (150 mm) in uncompacted depth to form a uniform foundation. Slipouts caused by the Contractor's operations shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

b. Revet mattress. The foundation shall be relatively smooth with no sharp ground breaks of dips or humps.

2. Basket Assembly. Assembly shall consist of rotating the panels into position and joining the vertical edges.

Welded wire mesh panels shall be joined along the vertical edges with spiral binders or tied. When tied, they shall be joined with tie wire passing through each mesh opening along the joint and secured with a locked loop. When spiral binders are used, the ends of the spiral binders shall be crimped to secure the spiral in place.

Twisted wire mesh panels shall be joined along the selvedged vertical edges with tie wire or locking wire fasteners. When tied, they shall be joined with tie wire at 4 in. (100 mm) nominal spacing with alternating single and double locked loops. When lock wire fasteners are used, they shall be applied at each mesh opening.

For either mesh style there shall not be any opening greater than a 5 in. (125 mm) maximum line dimension along the joined edges or at the corners of the baskets.

The wire mesh panel (base, ends, sides, diaphragms, and lid) shall be assembled such that the strength and flexibility at the connections are at least equal to that of a single panel.

Baskets may be assembled by using approved alternative fasteners. Alternative fasteners shall be fabricated such that when the ends are brought together and properly closed, the fastener forms a closed loop. The closed loop shall have an inside area that is large enough to enclose up to 4 selvedged wires. When closed around the basket wires, the free ends of the ring wire fastener (hog ring) shall overlap a minimum of 1 in. (25mm).

3. Erection of Baskets. The empty baskets shall be placed on the foundation. Each row, tier, or layer of baskets shall be reasonably straight and conform to the line and grade shown on the plans or as directed. Baskets used in retaining walls should be placed alternately as headers and stretchers. The empty baskets shall be fastened to the adjacent baskets along all

touching edges including top and bottom layers. Fastening shall be performed in the same manner as provided for assembling the baskets.

Unless otherwise indicated on the plans, the vertical joints between baskets of adjacent tiers or layers, along the length of the structure, shall be staggered by at least one basket width.

Before filling with rock, all kinks and folds in the wire mesh of the baskets shall be removed and all baskets shall be properly aligned. A standard fence stretcher, chain fall or steel rod may be used to stretch the wire baskets and hold alignment.

4. Baskets Fill Material. Fill material shall be rock ranging in size from a minimum of 4 in. (100 mm) to a maximum of 8 in. (200 mm) measured along the longest dimension. Rock shall be sound, durable, well graded, and obtained from an approved source.

5. Filling Baskets. The baskets shall be carefully filled with rock placed by hand and/or machine in such a manner that the alignment of the structure will be maintained and so as to avoid bulges and to minimize voids. All exposed rock surfaces shall have a reasonably smooth and neat appearance. No sharp rock edges shall project through the wire mesh.

   The baskets in any row or layer shall be filled in stages so that local deformations may be avoided. At no time shall any basket be filled to a depth exceeding 12 in. (300 mm) more than any adjacent basket.

   During filling operations, internal connecting wires shall be placed in the basket in the following manner:

   a. Each cell of the 3 ft. (1 m) high basket shall be filled to one-third its depth, after which connecting wires shall be placed in each direction as shown on the plans or as directed. Each end of the connecting wires shall be looped around two mesh openings. This operation shall be repeated when the cell is two-thirds full.

   b. For revet mattress, internal connecting wires are not required except when 1.5 ft. (450 mm) high baskets are used vertically, in which case the procedure under (a) above shall be followed.

The layer of rock shall completely fill the basket so that the lid will bear on the rock when it is secured. The lid shall be joined to the sides, ends, and diaphragms in the same manner as specified for joining the vertical edges. The basket lid shall be secured so that no more than 1 in. (25 mm) gap remains at any connection.

Basket rows or layers not completed at the end of each shift shall have the last basket filled with rock and tied internally as an end basket.

The minimum unit weight of a rock-filled basket shall be 110 pcf (1760 kg/m^3) Weight verification of a rock-filled basket shall be done when ordered.

Revet mattresses used for slope revetment and all sack gabions shall be secured by metal posts or stakes driven into the ground.

6. Backfilling Gabion Structure. The area behind the baskets shall be backfilled with approved granular material.

   Geotextile, if required, shall be spread uniformly over the back of the gabion structure as shown on the plans or directed. Joining edges of the geotextile shall be overlapped a minimum of 1 ft. (300 mm) and shall be anchored in position with approved anchoring devices. Backfill material shall be placed in a manner that will not tear, puncture, or shift the geotextile.

   The granular backfill material shall be placed in layers and shall be compacted until 95 percent of the maximum density determined by AASHTO T 99, Method C or D is obtained. The maximum thickness before compaction shall not exceed 1 ft. (300 mm). Lift thickness shall be decreased, if necessary, to obtain the specified density.

C. *Stone Filter Berms / Dams.* A stone filter berm/dam removes and stores sediment particles from runoff water. The rock used in constructing stone filter berm/dam should be graded with a minimum size of 1 in. (25 mm) and range in size to a maximum of 8 in. (200 mm) measured along the longest dimension.

D. *Sediment Basins.* A sediment basin is a constructed pond that removes and stores sediment particles from runoff water. The size of the basin shall be as shown in the plans or as directed. The inlet, outlet, and emergency spillway of the basin shall be stabilized in an approved manner.

E. *Inlet and Outlet Protection.* The ground at the inlet and outlet of pipes and other water discharges shall be protected as shown in the plans or as directed.

212.04 Method of Measurement. Slope drain will be measured by the foot (meter) along the length of plastic liner or pipe complete in place.

Straw bale will be measured by each bale complete in place.

Waterbar, stabilized construction entrance, sediment trap, and sediment basin will be measured by each complete in place.

Silt fence will be measured by the foot (meter) along the ground complete in place.

Diversion channel, diversion ditch, dike, berm, and siltation berm will be measured by the foot (meter) along the centerline complete in place.

Open-top Culvert will be measured by the foot (meter) complete in place.

Soil Binder will be measured by the acre (hectare) of surface treated.

Gabion and revet mattress will be measured by the cubic yard (cubic meter) complete in place based upon the nominal size of the units.

Stone filter berm and dam will be measured by the cubic yard (cubic meter) complete in place using the average end area method.

212.05 Basis of Payment. Payment for accepted work will be as follows:

Pay Item	Pay Unit
Slope Drain	ft. (m)
Straw Bale	Each
Sediment Trap	Each
Silt Fence	ft. (m)
Diversion Channel	ft. (m)
Diversion Ditch	ft. (m)
Dike	ft. (m)
Berm	ft. (m)
Open-Top Culvert	ft. (m)
Waterbar	Each

Siltation Berm.....ft. (m)
Stabilized Construction Entrance.....Each
Soil Binder .....Acre. (ha)
Gabion ..... CY (m^3)
Revet Mattress ..... CY (m^3)
Stone Filter Berm Type..... CY (m^3)
Stone Filter Dam Type ..... CY (m^3)
Sediment Basin.....Each

In the event that temporary erosion and sediment control measures are required due to the Contractor's negligence, carelessness, or failure to install and maintain permanent controls as a part of the work as scheduled or directed, such work shall be performed by the Contractor at the Contractor's expense.

Seeding, erosion blanket, mulching, and other seeding items will be measured and paid for under appropriate items of Section 621 - Seeding.

Berm, ditch, pipe apron, rock, and excavation used either to direct drainage to a slope drain or to construct a stabilized discharge area will not be measured nor paid for separately but shall be considered incidental work to slope drain.

Geotextile, rock, sandbags, and plastic liner used in construction of sediment trap, diversion channel, or diversion ditch will not be measured nor paid for separately but shall be considered incidental work to these items.

Wire reinforcing fence, geotextile, and posts for silt fence will not be measured nor paid for separately but shall be considered incidental work to silt fence.

Diversion channels, diversion ditches, berms, and dikes constructed as a standard part of the Contractor's normal operation within the slope limits will not be measured nor paid for separately but shall be considered incidental work to excavation or borrow.

Ditches built in conjunction with dikes and berms will not be measured nor paid for separately but shall be considered incidental work to dike or berm. Swale, rolling dip, and inlet protection will not be measured nor paid for separately but shall be considered incidental work to other erosion and sediment control items.

Geotextile and graded aggregate for stabilized construction entrance will not be measured nor paid for separately but shall be considered incidental work to stabilized construction entrance.

Structure excavation and compacting backfill for gabion and revet mattress will be measured and paid for under Section 210 - Structure Excavation and Compacting Backfill. Geotextile for gabion and revet mattress will be measured and paid for under SSP-640 Construction Geotextile.

No separate payment will be made for inspection or maintenance of erosion and sediment control measures.

SECTION 213 - TOPSOIL

213.01 Description. This work shall consist of excavating suitable topsoil from stockpiles, sources outside the roadway, or from its natural position on portions of the right-of-way that will be occupied by the roadway. It shall include the placing of topsoil upon designated constructed cut and fill slopes after grading operations are complete. All work shall be in accordance with these specifications and in reasonably close conformity with the lines and thicknesses shown on the plans or as directed.

213.02 Materials. Topsoil shall consist of surface soil capable of supporting vegetation which is reasonably free of subsoil, refuse, stumps, roots, rocks, brush, weeds, or other material which would discourage proper preparation to receive grass seed.

213.03 Construction Requirements. Topsoil excavated from the roadway shall be placed directly upon cut and fill slopes without use of stockpiles whenever conditions and the progress of construction will permit. Where this procedure is not possible, topsoil shall be excavated and stockpiled along the project at designated locations.

Topsoil shall not be placed in its final position until the areas to be covered have been properly prepared and grading operations in the area have been substantially completed.

Topsoil shall be placed and spread at locations shown on the plans and shall be keyed to the underlying material by the use of harrows, rollers, or other equipment suitable for the purpose.

The thickness of topsoil placement shall be 6 inches (150 mm) unless otherwise specified.

213.04 Method of Measurement. Topsoil obtained from the roadway and placed directly upon designated slopes or placed in temporary stockpiles shall be measured

in its original position or in approved stockpiles. Topsoil measured by the square yard (square meter) shall be measured parallel to the slope.

213.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Topsoil	CY or SY (m^3 or m^2)

Topsoil excavated from the roadway will be paid for at the contract unit price per cubic yard (cubic meter) for Excavation in accordance with Section 205 - Excavation and Embankment.

In addition, topsoil in its final position will be paid for at the unit bid price for Topsoil, which price shall include the cost to stockpile (if necessary), to haul to the site where it is to be used and to place and finish on the slope.

SECTION 214 - ROADSIDE CLEANUP

214.01 Description. This work shall consist of removal and disposal of stumps, foundations, debris, boulders, and minor leveling and drifting of material between the limits of clearing and right-of-way only, in accordance with the specifications or plans, and as directed. Necessary cleanup resulting from the Contractor's operations will not be included in this work.

214.02 Materials. Not Specified.

214.03 Construction Requirements. Not Specified

214.04 Method of Measurement. Work covered by this item will be measured and paid for in accordance with Subsection 109.03.

214.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Roadside Cleanup (Contingency Item)	Contingency Amount

SECTION 300 – BASES

SECTION 301 - GRANULAR SUBBASE

301.01 Description. This work shall consist of furnishing and placing one or more courses of granular subbase on a prepared surface in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans, or as established. Granular Subbase course(s) are part of the pavement section and may require processing to meet materials requirements. Granular Subbase is placed on the subgrade and below the base course(s).

301.02 Materials. The material for Granular Subbase shall meet applicable requirements of Section 703 - Aggregates. The Granular Subbase material will be accepted at the point of processing.

Tests shall be made in accordance with the following applicable standard methods:

Compaction Standard for Coarse Granular Materials
by Use of the Vibratory Spring-load Compactor .....Idaho T-74

In-Place Density and moistuere content of Soil and Soil Aggregatete
by Nuclear Methods (Shallow Depth) .....AASHTO T-310
Method B

Prior to placement on the roadway, the Contractor shall prepare and submit to the Engineer an Idaho T-74 density curve for the subbase material to be incorporated into the project. The testing to prepare the curve shall be incidental, no separate compensation shall be made. Idaho T-74 density curve does not need to be prepared where ten percent or more is retained on the 3 in. (75 mm) sieve unless 10 percent or more of the material is retained on the 75 mm (3 in.) sieve “using 30 kg (65 lb) sample”. In which case shaping and compaction shall be in accordance with Subsection 205.03 “Too granular to test”.

301.03 Construction Requirements.

A. *General.* If the required compacted thickness of the granular subbase course exceeds 0.8 ft. (240 mm), the subbase shall be constructed in two or more

courses of approximate equal thickness. The maximum compacted thickness of any one layer shall not exceed 0.8 ft. (240 mm). When vibrating or other approved types of special compacting equipment are used, the compacted thickness of a single course of the subbase may be increased to 1 ft. (300 mm). The minimum compacted thickness of any course shall be 1.5 times the maximum particle size.

Unless otherwise specified, mixing of the subbase shall conform to the requirements of Subsection 303.03.

Shaping and compaction of the subbase shall be in accordance with Subsection 303.03. unless 10 percent or more of the material is retained on the 3 in. (75 mm) sieve "using 65 lb. (30 kg) sample". In which case shaping and compaction shall be in accordance with Subsection 205.03, Part D – Density Determination, Standard Method Table, "Too Granular to Test".

B. *Granular Subbase Material in Stockpile.* This work shall consist of furnishing granular subbase material, which requires processing to meet these specifications, in stockpiles at designated locations. Stockpile requirements shall be in accordance with Subsection 303.03.

C. *Granular Subbase Material, Load, Haul and Place.* This work shall consist of loading, hauling and placing on the roadbed, stockpiled granular subbase material from designated sources. The granular material shall be spread, processed, distributed, shaped and compacted in accordance with this Section. The location and cost of the stockpiled subbase material will be set forth in the special provisions.

301.04 Method of Measurement. Granular Subbase material in stockpile will be measured by the ton (metric ton) or cubic yard (cubic meter). Granular Subbase will be measured by the ton (metric ton) or cubic yard (cubic meter) except that moisture in the material in excess of 7 percent will not be measured.

301.05 Basis of Payment. Payment for accepted work will be as follows:

Pay Item	**Pay Unit**
Granular Subbase	Ton or CY (t or m^3)
Granular Subbase in Stockpile	Ton or CY (t or m^3)
Granular Subbase Load, Haul, and Place	Ton or CY (t or m^3)

SECTION 302 - EMULSION TREATED BASE

302.01 Description. This work shall consist of furnishing and placing one or more courses of emulsion treated base in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses and typical sections shown on the plans or as established.

302.02 Materials. Aggregate shall meet the applicable requirements of Section 703 - Aggregates. Aggregate will be accepted for quality requirements at the crushing plant except for material from Contractor furnished sources which will be accepted at the point of delivery.

Emulsified asphalt shall be of the type and grade called for in the contract. Emulsified asphalt shall meet the applicable requirements of Section 702, Asphalt. The asphalt will be accepted at the point of delivery.

Testing shall be in accordance with applicable standard methods set forth under Subsection 303.02.

302.03 Construction Requirements. The aggregate, emulsified asphalt and water shall be mixed in an approved stationary plant.

Emulsified asphalt shall be mixed with water at a ratio of 1:1 and uniformly mixed with the aggregate base until approximately 4 percent diluted emulsified asphalt, by weight of dry aggregate, has been added. Additional water may be required to complete the mixing of the aggregate base and to facilitate compaction.

The base material shall be placed on the roadbed by means of an approved aggregate spreader. If the required compacted depth of the base exceeds 0.5 ft. (150 mm), the base shall be constructed in two or more layers of approximate equal thickness. The maximum compacted thickness of any one layer shall not exceed 0.5 ft. (150 mm). When vibrating or other approved types of special compacting equipment are used, the compacted depth of a single layer of the base may be increased to 0.8 ft. (250 mm) upon approval.

Shaping and spreading may be done with motor graders or approved methods in areas where it is not practical to operate the spreader.

After each layer has been spread, it shall be compacted for its full width. The choice of equipment will be left to the Contractor. Compaction shall continue until not less than 100 percent of the standard density is attained.

The surface of each layer shall be maintained during the compaction operations in such a manner that a uniform texture is produced and the aggregates firmly keyed.

302.04 Method of Measurement. Emulsion treated base and emulsified asphalt will be measured by the ton (metric ton). Batch weights will not be permitted as a method of measurement. The emulsion treated base quantity shall be the weight used in the accepted base and shall include the weight of aggregate and emulsified asphalt.

It is intended that the total water and emulsified asphalt shall not exceed 7 percent of the weight of the dry aggregate. The weight of water and emulsified asphalt in excess of 7 percent of the weight of dry aggregate will be deducted from the weight of the emulsion treated base.

302.05 Basis of Payment. Payment for accepted work will be as follows:

Pay Item	Pay Unit
Emulsion Treated Base	Ton (t)
Emulsified Asphalt for Emulsion Treated Base	Ton (t)

SECTION 303 - AGGREGATE BASE

303.01 Description. This work shall consist of furnishing and placing one or more courses of aggregate on a prepared surface in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established.

303.02 Materials. The aggregate shall meet the applicable requirements of Section 703 - Aggregates. The aggregate will be accepted from the windrow or roadway, except when purchased and stockpiled, then acceptance will be at the crushing plant.

Aggregate control shall be monitored by performing complete sieve analyses on samples of base. A consistency check shall be made using the percent passing the No. 4 (4.75 mm) sieve and the No. 200 (0.075 mm) sieve. The variation from the

as crushed stockpile average shall not exceed ±6 percent on the No. 4 (4.75 mm) sieve and ±2 percent on the No. 200 (0.075 mm) sieve for samples of base, taken from a belt used in loading trucks or from the roadway.

Crushed glass may be used in base and shall be uniformly blended with the aggregate. The glass-aggregate blend shall meet the aggregate gradation specified for the project.

Glass crushed to 3/4 in. (19 mm) minus may be used up to approximately 15% by weight of aggregate base. Such glass-aggregate base material must be placed at least 1 ft. (300 mm) below unpaved surfaces.

Glass crushed to 5/16 in. (8 mm) minus may be used up to approximately 15% by weight in aggregate base, with no restriction as to location.

Tests shall be made in accordance with the following applicable standard methods:

Compaction Standard for Coarse Granular Materials
by Use of the Vibratory Spring-load Compactor .....Idaho T-74

In-Place Density and moisture content of Soil and Soil Aggregate
by Nuclear Methods (Shallow Depth) .....ASSHTO T 310
Method B

In lieu of Idaho T-74, the standard density of aggregate base may be determined in accordance with the following:

Moisture Density Relations of Soils .....AASHTO T 180
Method D

Prior to placement on the roadway, the contractor shall prepare either an Idaho T-74 density curve or an AASHTO T 180, Method D, moisture-density curve for the aggregate base to be incorporated into the project, and submitted to the Engineer. This testing shall be incidental, no separate compensation shall be made.

303.03 Construction Requirements.

A. *General.* If the required compacted depth of the base exceeds 0.5 ft. (150 mm), the base shall be constructed in two or more layers of approximate equal

thickness. The maximum compacted thickness of any one layer shall not exceed 0.5 ft. (150 mm). When vibrating or other approved types of special compacting equipment are used, the compacted depth of a single layer of the base may be increased to 0.8 ft. (250 mm) upon approval.

Unless otherwise specified, the Contractor shall mix the base by one or a combination of the four methods specified below.

1. *Stationary Plant Method.* The aggregate and water shall be mixed in an approved mixer. Water shall be added during the mixing operation in an amount necessary to facilitate compaction. After mixing, the base material shall be placed on the roadbed by means of an approved aggregate spreader.

2. *Travel Plant Method.* After the material for each layer of base has been placed through an aggregate spreader or windrow sizing device, the base shall be uniformly mixed by a traveling mixing plant. During the mixing, water shall be added in an amount necessary to facilitate compaction.

3. *Road Mix Method.* After material for each layer of base has been placed, the materials shall be mixed by motor graders or other approved equipment until the mixture is uniform throughout. During the mixing, water shall be added in an amount necessary to facilitate compaction.

4. *Premixed Method.* The aggregate and water shall be mixed in an approved manner prior to placement on the roadway. Water shall be added during the mixing operation in an amount necessary to facilitate compaction. After mixing, the base material shall be placed on the roadway by means of an approved aggregate spreader.

After each layer has been spread, it shall be compacted for its full width. The choice of compaction equipment will be left to the Contractor. Compaction shall continue until not less than 95 percent of the standard density is attained. The standard density shall be determined in accordance with standard methods listed herein.

The determination of the density of aggregate base in place shall be in accordance with AASHTO T 310, Method B.

x The surface of each layer shall be maintained during the compaction operations in such a manner that a uniform texture is produced and the aggregate firmly keyed. Water shall be uniformly applied over the base materials during compaction in the amount necessary for proper compaction.

B. *Aggregate Base Material in Stockpile.* This work shall consist of furnishing aggregate base material meeting these specifications in stockpiles at designated locations.

Prior to placing material in stockpile, the site shall be prepared by clearing and smoothing as directed.

Stockpiles shall be neat and regular in form and shall occupy as small an area as possible. They shall be constructed by first distributing the material to be stockpiled over the entire base and building upward in successive layers not more than 3 ft. (1 m) in depth. End dumping or conveyor stacking of materials over the sides of the pile will not be permitted.

C. *Aggregate Base Material, Load, Haul and Place.* This work shall consist of loading, hauling, and placing on the roadbed stockpiled aggregate from designated sources.

The aggregate shall be spread, processed, distributed, shaped, and compacted in accordance with this Subsection. The location and cost of the stockpiled aggregate will be set forth in the special provisions.

303.04 Method of Measurement. Aggregate base material in stockpile will be measured by the ton or cubic yard (metric ton or cubic meter). Aggregate base will be measured by the ton or cubic yard (metric ton or cubic meter), except that moisture in the aggregate in excess of 7 percent will not be paid for.

303.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
____Aggregate Type _____for Base	Ton or CY (t or m^3)
____Aggregate Type_____in Stockpile	Ton or CY (t or m^3)
____Aggregate Type _____Load, Haul, Place	Ton or CY (t or m^3)

No separate payment will be made for glass used in aggregate base.

SECTION 304 - RECONDITIONING

304.01 Description. This work shall consist of reconditioning the surface of an existing road, shaping the shoulders, and disposal of surplus material, all in reasonably close conformity with the plans and these specifications or as established.

304.02 Materials. Not Specified.

304.03 Construction Requirements. The roadbed, including the shoulders, shall be scarified to the depth and width required. The scarified material shall be pulverized so that not more than 5 percent of this material, exclusive of gravel or stone, will be retained on a 2 in. (50 mm) sieve. The pulverized material shall be moistened and compacted to the required density. Blading and watering of the surface, if ordered, shall be continued during the rolling operations. The surface shall be satisfactorily maintained until the base or surface course has been placed. If required, additional water shall be applied to prevent checking or raveling.

Soft spots shall be repaired by one of the following methods:

1. If the Engineer determines the material is unsuitable, then the contractor shall remove and dispose of the material.
2. If the material is suitable for construction purposes except for excessive moisture content, the soft spots shall be repaired.

Repairs shall restore the subgrade so as to meet the compaction and density requirements as outlined in Subsection 205.03, Class A Compaction. Repairs shall consist of excavation, drying, replacement, and compaction of the in-place soils or replacement and compaction with approved material at the Contractor's option. The limits of areas included in soft spot repair shall be determined by the Engineer.

304.04 Method of Measurement. Reconditioning will be measured by the station or mile (meter or kilometer) as indicated on the plans and shall include all blading of shoulders, if required, the scarifying and pulverizing of the existing roadbed, the conservation of existing asphalt mixtures, the compaction of the roadbed, the finishing of the surface, and the maintenance of the completed surface if applicable.

Excavation of soft spots and soft spot repair will be measured by the cubic yard (cubic meter) in its original position using the average end area method.

Water will be measured by the MG (cubic meter) by means of calibrated tanks or distributors or by means of accurate water meters. Only that water which is used in mixing materials or ordered to keep the surface moist will be measured for payment.

304.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Reconditioning	Sta. or mi (m or km)
Water for Reconditioning	MG (m^3)
Excavation of Soft Spots	CY (m^3)
Soft Spot Repair	CY (m^3)

Removal and disposal of unsuitable material shall be paid under excavation of soft spots. Any backfill material used to replace unsuitable material shall be paid under its respective item or as extra work.

Soft spot repair shall include excavation, drying, replacement, and compaction of the in-place soil; or with approval, Contractor's optional replacement and compaction.

SECTION 306 - ROLLING

306.01 Description. This work shall consist of furnishing and using rollers for the compaction of earthwork, base, granular borrow, rock embankments, surface courses, surface treatments and seal coats in accordance with these specifications.

Whenever end results are specified, the Contractor may use whatever compaction equipment that produces the required compaction.

The rollers, unless otherwise directed, shall operate at a speed of from 3 to 5 mph (5 to 8 km/h).

306.02 Materials. Not Specified.

306.03 Construction Requirements. The Contractor shall furnish the Engineer with the weight of each roller by: a) manufacturer's rating attached to the roller; b) manufacturer's specifications; or c) direct scale reading.

1. *Steel Rollers.* Steel rollers shall consist of 3-wheel or tandem type self-propelled rollers equipped with cleaning devices to prevent adhesion of material to the wheels.

   Steel-wheel rollers for use on base material and reconditioning shall have a minimum weight of 10 tons (9 t) and a minimum compression of 325 lb./in. (6 kg/mm) of width for the rear wheels or drum.

   Tandem axle rollers for use on plant mix and road mix shall weigh 8 to 12 tons (7 to 11 t). A 3-axle tandem weighing 10 to 14 tons (9 to 13 t) may be permitted for finish rolling.

2. *Pneumatic-Tire Rollers.* Wherever required and permitted by specifications, self-propelled rollers with adequate power to perform the required compaction shall be furnished.

   Pneumatic - tire rollers used on seal coats, surface treatments, and roadmix pavement shall use tire inflation pressures of 55 psi (380 kPa) and wheel loadings of 220 lb. (100 kg) per inch width of tire. Should metric tires for rollers become available, minimum wheel loadings shall be 4 kg/mm width of tire. Tire width shall be as indicated on the tire sidewall.

   Pneumatic - tire rollers used for compacting bases and plant mix pavement shall use tire inflation pressures of 110 psi (760 kPa) and minimum wheel loadings 400 lb. (180 kg) per inch width of tire. Should metric tires for rollers become available, minimum loadings shall be 7 kg/mm width of tire. Tire width shall be as indicated on the tire sidewall.

   Rollers shall be equipped with smooth compactor tires. The use of wobble-wheel rollers whose tires revolve in a plane which is not at right angles to the axle shaft will not be permitted. The air pressure in any tire shall not vary more than 5 psi (35 kPa) from the pressure established. For use on seal coats and surface treatments the rollers shall be operated at speeds of not less than 3 nor more than 8 mph (5 nor more than 13 km/h) unless otherwise provided or directed. Pneumatic rollers shall not be used for finish rolling on asphalt surface courses.

3. *Vibratory Rollers.* Wherever required and permitted by the specifications, the Contractor shall furnish vibratory rollers which are adequately designed and

powered to perform the required compaction. They shall be of sufficient size and number to keep up with roadway production while providing the required density.

Vibratory rollers for use on rock embankments, granular borrow and bases shall generally meet the speed and frequency ranges (vibrations per minute) shown in the following table. Rollers should be operated at high amplitude unless otherwise directed. Self-propelled or towed units will be acceptable.

BASE AND EARTHWORK

Impacts Per Foot (Meter)

Roller Speed	VPM = Vibrations Per Minute							
ft./min (m/min)	1000	1200	1400	1600	1800	2000	2200	2400
88 (27)	11(37)	14(44)	16(52)	18(59)	20(67)	23(74)	25(81)	27(89)
132 (40)	8(25)	9(30)	11(35)	12(40)	14(45)	15(50)	17(55)	18(60)
176 (54)	6(19)	7(22)	8(26)	9(30)	10(33)	11(37)	13(41)	14(44)
220 (67)	5(15)	6(18)	6(21)	7(24)	8(27)	9(30)	10(33)	11(36)
264 (80)	4(13)	5(15)	5(18)	6(20)	7(23)	8(25)	8(28)	9(30)
308 (94)	3(11)	4(13)	5(15)	5(17)	6(19)	7(21)	7(23)	8(26)
352 (107)		3(11)	4(13)	5(15)	5(17)	6(19)	6(21)	7(22)
396 (121)			4(12)	4(13)	4(15)	5(17)	5(18)	6(20)
440 (134)				4(12)	4(13)	5(15)	5(16)	5(18)

Vibratory rollers for use on plant mix base and surfacing shall meet the speed and frequency ranges shown in the following table. Rollers shall be operated at low amplitude unless otherwise directed. Only drum-type rollers will be permitted and they shall meet the following minimum requirements: 1600 vibrations/minute (VPM), static force on drums of 125 lb./in. (2.2 kg/mm), and total applied force on vibrating drums (dynamic plus static) of 325 lb./in. (5.8 kg/mm).

Rollers shall be equipped with spray bars to prevent pickup of asphalt material and shall be self-propelled. Vibrators shall be shut off whenever the roller stops. On tender mixes, or steep grades, and whenever directed, rollers shall be operated as a static roller until the mix is dense enough to permit vibratory compaction with a minimum of displacement.

ASPHALT PAVING
Impacts Per Foot (Meter)

Roller Speed	VPM = Vibrations Per Minute							
ft./min (m/min)	**1600**	**1800**	**2000**	**2200**	**2400**	**2600**	**2800**	**3000**
88 (27)	18(59)	20(67)	23(74)	25(81)	27(89)	30(96)	32(104)	34(111)
132 (40)	12(40)	14(45)	15(50)	17(55)	18(60)	20(65)	21(70)	23(75)
176 (54)		10(33)	11(37)	13(41)	14(44)	15(48)	16(52)	17(56)
220 (67)				10(33)	11(36)	12(39)	13(42)	14(45)
264 (80)							11(35)	11(38)

Ten or more impacts per foot (33 or more impacts per meter) required to avoid washboards.

Other types of rollers, specifically designed and manufactured for use on granular borrow, rock embankments, small areas of base and pavement and other special applications, may be approved by the Engineer provided satisfactory compaction is obtained. Grid rollers, vibratory pan compactors, tamping rollers, and various special compactors will be classed as miscellaneous rollers.

306.04 Method of Measurement. Not Specified.

306.05 Basis of Payment. Unless otherwise provided, rolling will not be paid for separately but shall be included in the contract price for the various items entering into the work.

SECTION 307 – OPEN-GRADED ROCK BASE (ROCK CAP)

307.01 Description. This item shall consist of crushing, screening, hauling, placing and compacting open-graded rock base (Rock Cap) as shown in the typical cross sections or as directed.

307.02 Materials. Material for open-graded rock base (Rock Cap) shall meet the applicable requirements of Section 703 - Aggregates.

307.03 Construction Requirements.: The first layer of open-graded rock base placed directly over Type II Subgrade Separation Geotextile, shall be placed in a lift of not less than 12 in. (300 mm) thick nor more than 18 in. (450 mm) thick. Above the initial lift, the minimum lift thickness shall be 6 in. (150 mm); the maximum lift

thickness shall be 12 in. (300 mm). The first layer will be compacted with a minimum of 6 passes of a vibratory roller meeting the requirements of Subsection 205.03, Part B. Subsequent layers of open-graded rock base shall be compacted to the requirements of Subsection 205.03, Part B.

Equipment will not be allowed on the geotextile prior to placing the first lift of open-graded rock base. Dumping the open-graded rock base directly on the geotextile will not be permitted. The material shall be dumped on the previously placed lift and pushed ahead.

Any evidence of the vibrating rollers causing excess movement, depressions or voids other than what is considered normal compaction displacement shall be cause to have the vibrators switched off until otherwise directed by the Engineer. During the compaction process the open-graded base shall be kept visibly moist.

Once the open-graded rock base is in place, soil, mud or other undesirable fine material, which may impair the free draining characteristics of the open-graded rock base, will be kept from accumulating on its surface. If contamination does occur due to the construction operation, replacement costs will be borne by the Contractor.

307.04 Method of Measurement. Measurement of open-graded rock base will be by the cubic yard (cubic meter), neat line measurement of the roadway section, or by the ton (metric ton).

307.05 Basis of Payment. Payment for accepted work will be as follows:

Pay Item	**Pay Unit**
Open-graded rock base (Rock Cap).....	CY or Ton (m^3 or t)

Geotextile will be paid for under Section 640 – Construction Geotextile.

SECTION 400 - SURFACE COURSES AND PAVEMENT

The Contractor shall adequately protect all private property, bridges, sign posts, guardrail, and other roadway structures from being discolored by asphalt. In the event such structures become discolored by asphalt, the Contractor shall remove the discoloration in a satisfactory manner and, if required, repaint the surfaces.

Asphalt shall be applied at the temperature as ordered which shall be within the range specified below for the type and grade of material used.

TABLE - APPLICATION TEMPERATURES, °F (°C)

Type and Grade of Asphalt	Pugmill Mixture Temperatures[1]		Spraying Temperatures[5]			
	Dense - Graded Mixes		Road Mixes		Surface Treatments	
Cutback Asphalt (RC, MC, SC)[2]						
	°F	(°C)	°F	(°C)	°F	(°C)
30 (MC only)	-	-	-	-	85+	(30+)
70	135-175[3]	(55-80)[3]	65+	(20+)	120+	(50+)
250	165-210[3]	(75-100)[3]	105+	(40+)	165+	(75+)
800	180-240[3]	(80-115)[3]	135+	(55+)	200+	(95+)
3000	-	-	-	-	230+	(110+)
3000R	-	-	-	-	250+	(120+)
Emulsified Asphalt[4]						
	°F	(°C)	°F	(°C)	°F	(°C)
RS-1	-	-	-	-	70-140	(20-60)
RS-2	-	-	-	-	125-185	(50-85)
MS-1	50-160[4]	(10-70)[4]	70-160	(20-70)	-	-
MS-2	50-160[4]	(10-70)[4]	70-160	(20-70)	-	-
MS-2h	50-160[4]	(10-70)[4]	70-160	(20-70)	-	-
SS-1	50-158[4]	(10-70)[4]	70-160	(20-70)	-	-
SS-1h	50-160[4]	(10-70)[4]	70-160	(20-70)	-	-
CRS-1	-	-	-	-	125-185	(50-85)

CRS-2 & 2h	-	-	-	-	150-185	(65-85)
CMS-2 & 2s	50-160[4]	(10-70)[4]	70-160	(20-70)	-	-
CMS-2h	50-160[4]	(10-70)[4]	70-160	(20-70)	-	-
CRS-2R	-	-	-	-	150-185	(65-85)
CSS-1	50-160[4]	(10-70)[4]	70-160	(20-70)	-	-
CSS-1h	50-160[4]	(10-70)[4]	70-160	(20-70)	-	-

NOTES: Temperatures for cutback asphalt are guides only.

[1]Temperatures of mixture immediately after discharge from the pugmill rather than temperature of cutback asphalt.

[2]Application temperatures may, in some cases, be above the flash point of the material. Caution must therefore be exercised to prevent fire or an explosion.

[3]Rapid Curing (RC) grades are not recommended for hot pugmill mixing.

[4]Temperature of the emulsified asphalt in the pugmill mixture.

[5]The maximum temperature (cutback asphalt) shall be below that at which fogging occurs.

SECTION 401 - TACK COAT

401.01 Description. This work shall consist of preparing and treating an existing surface with asphalt in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or established.

401.02 Materials. Asphalt shall be of the type and grade called for in the contract. The grade may be changed one step by the Engineer at no change in unit price. Asphalt shall meet the applicable requirements of Section 702 - Asphalt. The asphalt will be accepted at point of delivery.

401.03 Construction Requirements. The equipment shall meet the applicable requirements of Subsection 406.03.

The existing surface shall be patched and cleaned and shall be free of irregularities to provide a reasonably smooth and uniform surface to receive the treatment. Unstable corrugated areas shall be removed and replaced with suitable patching materials. Payment for the patching will be made at the contract unit price for the various items used unless a reconditioning item is included in the contract. The edges of existing pavement which are to be adjacent to new pavement shall be cleaned to permit the adhesion of bituminous materials.

Brooming will be in accordance with Subsection 403.03.

Asphalt tack shall be applied such that the application is uniform, limits of placement are appropriate, there is the least inconvenience to traffic, and traffic will not cause pickup or tracking.

When diluted emulsified asphalt is specified for the tack coat, approximately equal volumes of emulsified asphalt and water shall be mixed prior to application.

Asphalt shall not be applied when surface or weather conditions would prevent proper construction.

401.04 Method of Measurement. Asphalt for tack coat will be measured by the ton (metric ton). Diluted emulsified asphalt will be measured by the gallon (liter) with no correction for temperature.

401.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
____ Liquid Asphalt for Tack Coat	Ton (t)
____ Diluted Emulsified Asphalt for Tack Coat	gal. (L)

Any reapplication of the asphalt tack required due to time lag between the initial application and the paving operation will be at the Contractor's expense.

SECTION 402 - PRIME COAT

402.01 Description. This work shall consist of preparing and treating an existing surface with asphalt, and blotter if required, in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or established.

402.02 Materials. Asphalt shall be of the type and grade called for in the contract. The grade may be changed one step by the Engineer at no change in unit price. Asphalt shall meet the applicable requirements of Section 702, Asphalt.

The asphalt will be accepted at the point of delivery.

Blotter shall meet the applicable requirements of Section 703, Aggregates, and will be accepted in stockpile at the source except for material from Contractor furnished sources which will be accepted at the point of delivery.

402.03 Construction Requirements. Asphalt shall not be applied when surface or weather conditions would prevent proper construction.

The equipment shall meet the requirements of Subsection 406.03.

The surface to be primed shall be shaped to the required grade and section; shall be free from ruts, corrugations, segregated material, or other irregularities; and shall be uniformly compacted.

Asphalt shall be applied to the width of the section to be primed by means of a pressure distributor in a uniform, continuous spread. Care shall be taken that the application of asphalt at the junction of spreads is not in excess of the specified amount.

Skipped areas or deficiencies shall be corrected.

When traffic is maintained, one-way traffic shall be permitted on the untreated portion of the roadbed. As soon as the asphalt has been absorbed by the surface and will not pick up, traffic shall be transferred to the treated portion, and the remaining width of the section shall be primed.

The quantities, rate of application, temperatures, and areas to be treated shall be approved before application of the prime coat.

If, after the application of the prime coat, the asphalt fails to penetrate and the roadway must be used by traffic, blotter shall be spread by means of a self-propelled aggregate spreader of approved design supported by at least four wheels equipped with pneumatic tires on two axles. The aggregate spreader shall be equipped with positive controls so that the required amount of material will be deposited uniformly over the full width required to absorb the excess asphalt.

402.04 Method of Measurement. Asphalt will be measured by the ton (metric ton) and blotter will be measured by the ton or cubic yard (metric ton or cubic meter).

402.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
____ Liquid Asphalt for Prime Coat	Ton (t)
____ Emulsified Asphalt for Prime Coat	Ton (t)
Blotter	Ton or CY (t or m^3)

SECTION 403 - SEAL COAT

403.01 Description. This work shall consist of an application of asphalt, and anti-stripping additive, if required, followed by an application of cover coat material in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or established.

403.02 Materials. Asphalt shall be of the type and grade called for in the contract. The grade may be changed one step by the Engineer at no change in unit price. Asphalt and anti-stripping additive shall meet the applicable requirements of Section 702 - Asphalt. The asphalt will be accepted at the point of delivery.

The emulsified asphalt used for seal coating is subject to viscosity and sieve testing in the field or at a location other than the project site. The Contractor may be required to have his delivery time scheduled to allow testing prior to usage. Delays up to one hour can be expected for this testing.

Cover coat material shall meet the applicable requirements of Section 703 - Aggregates, and will be accepted at the point of loading to the roadway.

The contractor shall submit a seal coat design for each stockpile used. The method used to determine seal coat design shall be Idaho T-60 by both methods, completed two weeks prior to construction starting. The seal coat design shall be field verified for spread rate of oil and aggregate.

403.03 Construction Requirements.

A. *General.* Asphalt shall not be applied when the roadway surface or weather conditions would prevent satisfactory construction.

Unless otherwise directed, seal coating shall not be undertaken unless the pavement surface temperatures meet the following minimums for various grades:

RC-MC 250 .....60°F (16°C) and Rising
Emulsions .....80°F (27°C) and Rising
RC-MC 800 or 800R .....80°F (27°C) and Rising
RC-MC 3000 or 3000R .....80°F (27°C) and Rising

Seal coating will not be permitted when pavement surface temperature exceeds 140°F (60°C) unless authorized in writing. If bleeding becomes apparent on the completed seal coat, immediate maintenance and traffic control shall be initiated by the Contractor, and no further seal coating will be permitted until corrective action has been initiated.

Seal coats will not be applied when the wind velocity exceeds 15 mph (24 km/h) without specific approval from the Engineer.

Asphalt mixes shall cure a minimum of 10 days before a seal coat is applied.

If seal coats are allowed to be placed on Friday, or just before a three-day holiday weekend, special planning for emergency maintenance must be made.

Unless otherwise approved, no seal coat shall be applied before June 15 or after September 1.

The following equipment or its equivalent is required: Equipment for applying asphalt shall meet the applicable requirements of Subsection 406.03.

A rotary power broom.

Only pneumatic tire rollers shall be used. Rollers shall meet the requirements of Section 306, Rolling. The roller shall not be operated at a speed in excess of 8 mph (13 km/h) for the first coverage nor in excess of 16 mph (26 km/h) for subsequent coverages. A minimum of two pneumatic tired rollers will be required.

One self-propelled aggregate spreader of approved design supported by at least 4 wheels equipped with pneumatic tires on 2 axles. The aggregate spreader shall be equipped with positive controls so that the required amount of material will be deposited uniformly over the full width required.

Approaches shall be sealed before sealing the adjacent roadway. Asphalt shall not be spread until the surface has been cleaned as required and the section to be sealed has been approved. All bridge decks shall be thoroughly cleaned prior to asphalt application. Cleaning with high pressure water may be required where mechanical brooming is inadequate. If cleaning with water is required, the bridge deck shall be allowed to dry completely before application of asphalt. All deck drains and expansion joints are to be protected from the seal coat application, and the material used for this protection is to be removed and properly disposed of after completion of the seal coat. All asphalt and aggregate which may have spilled into deck drains and expansion joints shall be removed after completion of the seal coat. Asphalt shall be applied by means of a pressure distributor in a uniform, continuous spread over the section to be treated and within the temperature range specified. The quantity of asphalt to be used per square yard (square meter) shall be as directed. If the texture of the surface is such that asphalt penetrates too rapidly, a preliminary application of from 0.05 to 0.10 gal./SY (0.25 to 0.5 L/m^2) of surface may be required.

A strip of building paper at least 3 ft. (900 mm) in width and with a length equal to that of the spray bar of the distributor plus 1 ft. (300 mm) shall be used at the beginning of each spread. If the cutoff is not positive, the use of paper may be required at the end of each spread. The paper shall be removed and disposed of in a satisfactory manner. The distributor shall be moving forward at proper application speed at the time the spray bar is opened. Any skipped areas or deficiencies shall be corrected. Junctions of spreads shall be carefully made to assure a smooth riding surface.

The length of spread of asphalt shall not be in excess of that which trucks loaded with cover coat material can immediately cover.

Meet-lines shall be allowed within 1 ft. (300 mm) of lane lines or within 2 ft. (600 mm) of center of lanes only. Under no circumstances will meet lines be allowed within a wheel path.

The spread of asphalt shall not be more than 6 in. (150 mm) wider than the width covered by the cover coat material from the spreading device. Under no circumstances shall operations proceed in such manner that the asphalt will be allowed to chill, set up, dry, or otherwise impair retention of the cover coat material.

The distributor, when not spreading, shall be parked so that the spray bar or mechanism will not drip on the surface.

Immediately following the application of the asphalt, cover coat material shall be spread in quantities as designated. Spreading shall be accomplished in such a manner that the tires of the trucks or aggregate spreader at no time contact the uncovered asphalt. Pilot car traffic control operations shall not cross the fresh asphalt meet-line onto newly applied cover coat material.

If directed, the cover coat material shall be moistened with water to eliminate or reduce the dust coating of the aggregate.

Immediately after the cover coat material is spread, deficient areas shall be covered by additional material. Rolling shall begin immediately behind the spreader and shall be continued until four complete coverages are obtained. Rolling shall be completed prior to allowing traffic to use the new surface. The Contractor's equipment shall not be operated at a speed which turns or displaces the cover coat material. Turning of equipment which displaces or turns the cover coat material will not be permitted. Prior to brooming, it may be necessary to apply approved reject material over the surface as directed to absorb any free asphalt. Excess material shall be swept from the entire roadway surface by means of rotary brooms. Brooming shall be done by the morning following the previous day's seal coat application unless otherwise directed. Brooming shall be conducted so as not to displace embedded material. In curb and gutter section, excess material shall be picked up and disposed of as directed.

After the application of the seal coat and traffic has been routed on the roadway, a second brooming may be required approximately 24 hours after the first.

The brooms shall be in good condition and capable of sweeping a path at least 70 inches (1.8 m) wide without loosening or displacing embedded materials. The surface shall be swept when ordered.

Each broom will be accompanied by a shadow vehicle if working on highways open to traffic. The shadow vehicle shall be equipped with at least one roof-mounted high intensity rotating or strobe-type amber flasher. The flasher shall be readily visible from front and rear for 0.5 mi. (800 m).

Where brooming operations could create dust to the extent that it would violate air pollution regulations or create a safety hazard, the surface of the roadway to be swept shall be lightly sprayed with enough water to prevent dust from becoming airborne. Water applied for this purpose will be paid for as Water for Dust Abatement. If no item is set up for Water for Dust Abatement, it will be paid for as Extra Work.

Brooming chips from the surface onto maintained shoulder-foreslope areas will not be permitted where the adjacent property owner cares for the area and maintains turf or landscape.

B. *Cover Coat Material in Stockpile.* This work shall consist of furnishing and placing cover coat material of the class specified in stockpiles at designated locations.

The stockpile sites shall be prepared by clearing and smoothing as directed. Stockpiles shall be neat and regular in form and shall occupy as small an area as possible.

C. *Sanding Material in Stockpile.* This work shall consist of placing sand produced during the production of cover coat material and suitable for use as sanding material in stockpiles at designated locations.

The stockpile sites shall be prepared by clearing and smoothing as directed. Stockpiles shall be neat and regular in form and shall occupy as small an area as possible.

D. *Cover Coat Material, Load, Haul, and Place.* This work shall consist of loading cover coat material from designated sources, hauling and placing the cover coat material on the asphalt treated roadbed in accordance with the requirements of this Section. Before loading, the stockpiles shall be cleaned of all vegetation or other objectionable matter in an approved manner.

403.04 Method of Measurement. Seal coat will be measured as follows:

Asphalt will be measured by the ton (metric ton).

Anti-stripping additive will be measured by the percentage of additive per ton (metric ton) of asphalt.

Cover coat material placed on the roadbed, sanding material in stockpile, and cover coat material in stockpile will be measured by the ton or cubic yard (metric ton or cubic meter).

Cover coat material, load, haul and place will be measured by the ton or cubic yard (metric ton or cubic meter). The cubic yard (cubic meter) measurements may be determined by before-and-after measurement of the stockpile or by volume of the hauling vehicle at the point of delivery on the roadway.

Cover coat material placed in temporary stockpiles by, and for the convenience of, the Contractor will be measured by the ton or cubic yard (metric ton or cubic meter) making a deduction for material placed for a floor. The location of any temporary stockpiles shall be approved prior to use. Surplus cover coat remaining in temporary stockpiles shall be removed to an approved permanent storage site on completion of sealing operations. Temporary sites shall be left in an acceptable condition after removal of material.

Reject material used as blotter for seal coat maintenance shall be measured by the ton or cubic yard (metric ton or cubic meter) truck measure.

Brooming will be measured either by the mile (kilometer) or hours of actual time consumed in brooming. No allowance will be made for time consumed in making repairs or moving to or from the work. Where brooming is by the mile (kilometer), it shall mean one complete coverage of the entire roadway surface. Physically divided highways, ramps, crossroads, etc., shall be measured as separate roadways.

Approaches will be measured by the number sealed regardless of size. The quantities of asphalt and cover coat material used will be included and paid for under those respective items.

403.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
_____ Asphalt Cement for Seal Coat	Ton (t)
_____ Liquid Asphalt for Seal Coat	Ton (t)
_____ Emulsified Asphalt for Seal Coat	Ton (t)
Rejects	Ton or CY (t or m^3)
_____ Percent Anti-Stripping Additive for Seal Coat	TOA (MTOA)
Brooming	mi. (km) or Hr

Approaches .....Each
Cover Coat Material Class _____ in Stockpile .....Ton or CY (t or m^3)
Cover Coat, Material, Load, Haul and Place .....Ton or CY (t or m^3)
Cover Coat Material Class ____.....Ton or CY (t or m^3)

Brooming will only be paid for after the seal coat has been applied. The cost to clean the pavement surface to be seal coated shall be considered incidental to other items.

Where brooming is by the mile (kilometer) the unit bid price shall include brooming approaches.

Dust abatement water will be measured and paid for either under Subsections 205.04 and 205.05 or 104.03.

Payment for sanding material in stockpile will be made at the price per ton or cubic yard (metric ton or cubic meter) stipulated in the contract. Payment for haul on sanding material required to be stockpiled more than 1 mi. (1.5 km) outside the source boundary will be paid for as extra work, for hauling the distance in excess of the 1 mi. (1.5 km).

Cost to pick up excess material in curbed sections shall be included in the bid price of other items.

SECTION 404 - SURFACE TREATMENT

404.01 Description. This work shall consist of the construction of a single or multiple course surface treatment in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or established by the Engineer.

The surface treatment may consist of the application of one or more seal coats, or may consist of a prime coat followed by one or more seal coats as specified:

Type A surface treatment shall consist of the application of a seal coat.

Type B surface treatment shall consist of the application of a prime coat, followed by the application of a seal coat.

Type C surface treatment shall consist of the application of two seal coats.

Type D surface treatment shall consist of the application of a prime coat, followed by the application of two seal coats.

404.02 Materials. Asphalt shall be of the type and grade called for in the contract. The grade may be changed one step by the Engineer at no change in unit price. Asphalt and anti-stripping additive, if required, shall meet the applicable requirements of Section 702 - Asphalt. The asphalt will be accepted at the point of delivery.

Cover coat material and blotter shall meet the applicable requirements of Section 703 - Aggregates. The cover coat and blotter will be accepted at the point of loading to the roadway.

The Contractor shall submit a seal coat design for each stock pile used in accordance with Subsection 403.02

404.03 Construction Requirements. The prime coat, when specified, shall be applied in accordance with the requirements of Section 402, Prime Coat.

A curing period of 5 days may be required between the application of the prime coat and the next application of asphalt.

During the period between the application of the prime coat and the seal coat, the primed surface shall be kept in repair. Holes, ravels and areas deficient in prime shall be patched and repaired with aggregate-asphalt mixtures, by penetration methods, or other approved procedures. Loose material shall be broomed off prior to subsequent applications of asphalt.

Each seal coat shall be applied in accordance with Section 403, Seal Coat. If successive seal coats are to be applied, the first seal coat shall be maintained and permitted to cure for a period of 5 days.

Unless otherwise specified, the highway shall be kept open to traffic at all times. As soon as the asphalt is covered, controlled traffic may be permitted thereon.

404.04 Method of Measurement. Asphalt will be measured by the ton (metric ton) and blotter will be measured by the ton or cubic yard (metric ton or cubic meter). Anti-stripping additive will be measured by the percentage of additive per ton (metric ton) of asphalt. Cover coat material will be measured by the ton or cubic yard (metric ton or cubic meter) as provided in Subsection 403.04.

Brooming will be measured as provided in Subsection 403.04.

Approaches will be measured as provided in Subsection 403.04.

404.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
_____Asphalt Cement for Surface Treatment Type ____	Ton (t)
_____Liquid Asphalt for Surface Treatment Type ____	Ton (t)
_____Emulsified Asphalt for Surface Treatment Type ____	Ton (t)
Cover Coat Material Class____	Ton or CY (t or m^3)
Cover Coat Material Class ____ Load, Haul and Place	Ton or CY (t or m^3)
Blotter	Ton or CY (t or m^3)
Rejects	Ton or CY (t or m^3)
_____Percent Anti-Stripping Additive for Surface Treatment	TOA (MTOA)
Approaches	Each
Brooming	mi. (km) or Hr

SECTION 405 - PLANT MIX PAVEMENT

405.01 Description. This work shall consist of constructing one or more courses of plant mix pavement in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or as established.

405.02 Materials. The Contractor shall furnish a Job Mix formula (JMF) and a plant mix pavement that complies with the following requirements:

				Laboratory Air Voids, %		
Class of Mix	**Minimum Stability**	**Minimum Asphalt Film Thickness**	**Minimum Fine Aggregate Angularity**	**JMF Air Voids**	**Acceptance/ Production Paving Air Voids**	**Minimum Immersion Compression %**
I	37	6 micron	45	4.0	3.0 to 5.0	85
II	35	6 micron	45	4.0	3.0 to 5.0	85
III	30	6 micron	40	4.0	3.0 to 5.0	85
IV	(Not for use in permanent work)					

VMA and Asphalt Film Thickness shall be calculated in accordance with the Department's procedure as contained in the Quality Assurance Manual.

All plant mix designs shall use a minimum one-half percent (1/2%) approved anti-stripping additive by weight of asphalt.

Voids in Mineral Aggregate Criteria (VMA)	
Nominal Maximum Aggregate Size	**Minimum VMA, percent**
3/8 in. (9.5 mm)	15.0
1/2 in. (12.5 mm)	14.0
3/4 in. (19.0 mm)	13.0
1 in. (25.0 mm)	12.0
1 1/2 in. (37.5 mm)	11.0

Reclaimed asphalt pavement (RAP) shall not be allowed as part of the Job Mix formula unless specified in the contract.

Materials shall meet the applicable requirements of Section 700, Materials.

Aggregate 703

Asphalt.....702

Anti-Stripping Additive.....702

Tests shall be made in accordance with the following applicable standard methods:

Sieve Analysis of Fine and Course Aggregates.....AASHTO T 27
with
Materials Finer than 75um (No. 200) Sieve
In Mineral Aggregate by Washing .....AASHTO T 11
Methods A or B

Mechanical Analysis of Extracted Aggregate .....AASHTO T 30

Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus.....AASHTO T 246
(Cohesion section of T 246 does not apply.)

Preparation of Test Specimens of Bituminous Mixture by Means of California Kneading Compactor.....AASHTO T 247
(Test samples shall be mixed and compacted at the temperature determined through written recommendation from the asphalt binder supplier. The asphalt binder shall be the product used on project. A copy of such recommendation shall be furnished by the Contractor.)

Determining the Percentage of Fracture in Coarse Aggregate..AASHTO TP 61
Method 1

Percent Air Voids in Compacted Dense
and Open Bituminous Paving Mixtures.....AASHTO T 269

(When determining air voids of cores from field compacted mix, the maximum specific gravity value to be used for each test section is the average value of the mix samples obtained from that test section of the Acceptance Test Strip or from production paving in the absence of an Acceptance Test Strip.)

(Maximum theoretical specific gravity test result from each mix sample will be used to compute air voids on the laboratory compacted specimens from that mix sample.)

Theoretical Maximum Specific Gravity and
Density of Bituminous Paving Mixtures.....AASHTO T 209
Type A, Bowl Method

Bulk Specific Gravity of Compacted Bituminous
Mixtures Using Saturated Surface Dry Specimens .....AASHTO T 166
Method A

Bulk Specific Gravity of Compacted Bituminous
Mixtures Using Paraffin-Coated Specimens .....AASHTO T275

Pavement Straightedge Procedures .....Idaho T-87

Percentage of Coated Particles in Bituminous Mixtures .....Idaho T-96

In Place Density of Bituminous Mixes Using the
Nuclear Moisture-Density Gauge.....WAQTC TM-8
(Backscatter mode)

Determining Volume of Liquids in Horizontal or Vertical
Storage Tanks .....Idaho T-120

Acceptance Test Strip for Plant Mix Pavement.....Idaho T-125

Standard Method of Operation of the California Profilograph
and Evaluation of Profiles.....Idaho T-140

Determining the Asphalt Binder Content
of Hot Mix Asphalt (HMA) by the Ignition Method .....AASHTO T 308

Sampling Bituminous Paving Mixtures .....AASHTO T 168
Sample from roadway prior to compaction
(plate method)

Reducing Samples of Hot Mix Asphalt to Testing Size .....WAQTC TM-5

Moisture Content of Bituminous Mixes by Oven.....WAQTC TM-6

Plastic Fines in Graded Aggregate and Soils By Use of the
Sand Equivalent Test .....AASHTO T 176
Alternate Method #2, Prewet

Effect of Water on Cohesion of Compacted
Bituminous Paving Mixtures
(Immersion - Compression) .....AASHTO T 165

Uncompacted Void Content of Fine Aggregate .....AASHTO T 304
(Fine Aggregate Angularity) Method A

Flat Particles, Elongated Particles or Flat
and Elongated Particles in Course Aggregate .....ASTM D4791

405.03 Construction Requirements.

A. *Mix Design.* The plant mix design is the Contractor's responsibility. The Contractor's mix design shall provide the Job Mix Formula (JMF) for the project, using a qualified laboratory. The Job Mix Formula shall use the type and grade of asphalt called for on the plans and the brand and source of asphalt and additives the Contractor proposes to use on the project. At least five calendar days prior to the start of paving, the Contractor shall submit to the Engineer the mix design, including the Job Mix Formula showing the range of asphalt contents which meet the specification, in a form acceptable to the Engineer.

Include copies of all test reports, data, and worksheets used to meet the requirements of Subsection 405.02.

The Job Mix Formula shall establish a single percentage of aggregate passing the following sieve sizes: 2" (50.0 mm), 1½" (37.5 mm), 1" (25 mm), 3/4" (19.0 mm), 1/2" (12.5 mm), 3/8" (9.5 mm), No. 4 (4.75 mm), No. 8 (2.36 mm), No.16 (1.18 mm), No. 30 (0.6 mm), No. 50 (0.30 mm), No. 100 (0.15 mm), and No. 200 (0.075 mm). The single percentage passing as determined by the Job Mix Formula shall be within the minimum and maximum control points specified in Subsection 703.05.

The mix design shall have a minimum 0.4 percent range of asphalt content, which meets all specification requirements of Subsection 405.02. The Job Mix Formula shall specify a single aggregate gradation, a single asphalt content and a maximum theoretical density based on the specified gradation and asphalt content.

B. *Weather Limitations for Permanent Paving.* Plant mix shall not be placed on a wet or frozen surface or when weather or surface conditions otherwise prevent the proper handling or finishing of the plant mix material.

A paved surface will be required for travel if the project should extend into the winter. The Contractor will not be allowed to start construction on the pavement surface unless his progress schedule realistically shows that the pavement can be replaced or completed within the temperature limitations listed below.

Plant mix placed shall be in accordance with the following temperature limitations table. Both air and surface temperatures must meet the following minimum temperatures.

Air and Surface Temperature Limitations		
Compacted Thickness of Individual Courses	**Top Course**	**Leveling and Courses Below the Top Course**
Less than 0.10 ft. (30 mm)	60°F (16°C)	50°F (10°C)
0.10 to 0.18 ft. (30 to 55 mm)	50°F (10°C)	40°F (4°C)
Over 0.18 ft. (55mm)	40°F (4°C)	40°F (4°C)

C. *Mixing Plants.* Mixing plants shall be capable of producing a uniform mixture and conform to the following requirements:

1. *Plant Scales.* Plant and truck scales shall conform to Section 109, Measurement and Payment.

2. *Asphalt Storage.* Tanks for asphalt storage shall be equipped to heat and hold the materials at the required temperatures. Asphalt shall be stored and introduced into the mix at the temperatures recommended by the supplier. A copy of the supplier's recommendation shall be submitted to the Engineer.

   Heating shall be accomplished so that no flame shall be in contact with the tank. The storage system for the asphalt shall be designed to assure proper and continuous circulation during the operating period. The tank shall be level and a calibrated measuring rod, or other approved measuring device, shall be provided. Provisions shall be made for measuring and sampling contents of the storage tanks.

3. *Feeder.* The plant shall be equipped with accurate mechanical means for uniformly feeding the aggregate into the dryer. When multiple stockpiles are required, the cold aggregate feed equipment shall be capable of providing accurate metering of individual stockpiles into the mix. Should difficulty be experienced in achieving uniform feed of a designated material, it may be necessary to dry the material or use other acceptable means to achieve a uniform feed.

   The system shall provide positive weight control of the cold aggregate feed by use of a conveyor scale or other approved device. The feed shall be capable of rapid adjustment and shall maintain a consistent and uniform flow throughout the range of its calibration.

   Each compartment bin shall have an accurately controlled gate for proportioning the aggregate drawn from each compartment. The gate shall be rectangular with one dimension adjustable by positive mechanical means.

   When recycled plant mix is required, a scalping screen or other approved device installed ahead of any weight system shall be used to ensure that no salvaged plant mix material larger than 2-inches (50mm) is fed into the

hot plant. If a uniform mix is not achieved, it may be necessary to reduce the size of the recycled material fed into the plant.

There will be no screening or proportioning after the cold feed blending.

4. *Dryer/Mixer.* The plant shall include a dryer which continuously agitates the aggregates during the heating and drying process. The dryer shall be capable of meeting the aggregate moisture requirement of Subsection 405.03, Part F. All dryers shall be equipped with automatic burner controls.

   The plant shall include a mixer, which may be part of the dryer or a separate unit, capable of meeting the coating requirements of Subsection 405.03, Part F.

   When recycled plant mix is used, the recycled material shall be uniformly mixed and heated with the virgin aggregate before introduction of the asphalt binder. The recycled material shall not come into direct contact with the burner flame.

5. *Asphalt Control Unit*. The asphalt control unit must be interconnected with the aggregate feed control and be capable of delivering asphalt to the mix within ±0.2% of the intended quantity throughout the range of plant operation. Satisfactory methods, either by weighing or metering, shall be provided for determining the amount of asphalt delivered to the mix.

6. *Thermometric Equipment.* Continuous thermometric recording equipment shall be provided to indicate the continuous temperature of the asphalt in the storage tank, the temperature prior to entering the mixer, and the temperature of the heated material after leaving the dryer or pugmill.

7. *Sampling Devices.* The plant shall be equipped with adequate aggregate sampling devices in accordance with Subsection 106.11. An approved sampling device shall be provided on the plant's cold feed.

   A sampling device shall be provided on the mix plant's asphalt binder tank injection line. The asphalt binder shall be sampled in accordance with Subsection 8.19 of the ITD Field Test Manual, Part II - Quality Assurance Program.

8. *Discharge Hopper.* The plant shall be equipped with a discharge hopper having dump gates which will permit rapid and complete discharge of the mixture.

9. *Hot Storage.* Continuous mix plants shall have sufficient hot storage capacity to ensure continuous plant operation. Material shall not be removed below the top level of the cone of the hot storage silo except at the end of the day's production.

10. *Plant Calibration.* Plants shall be calibrated for accuracy requirements.

D. *Hauling Equipment.* Trucks used for hauling plant mix materials shall have tight, clean, smooth, metal beds. When necessary, each truck shall be covered with a canvas or other suitable material to protect the mixture from the weather. A release agent, suitable for its intended use, may be applied to truck beds. After application the truck bed shall be drained. Fuel oil or other petroleum oil shall not be used as a release agent.

The temperature of the plant mix shall not drop more than 20°F (11°C) between the hot plant and the paver.

E. *Paver.* The paver shall be a self-propelled unit provided with an activated heated screed. All screed extensions shall be activated and heated, except for minor shoulder widening not exceeding 1 foot (300 mm), and shall produce a pavement equal to that produced by the rest of the screed.

The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed.

Extended screeds shall be provided with corresponding auger and tunnel extensions to ensure a uniform head of fresh material across the entire screed. Alternate paver configurations will be considered provided they conform to the manufacturer's recommendations and it can be demonstrated to produce an acceptable pavement. The alternate configuration must be accepted in writing by the Engineer prior to use on the project.

The screed shall be equipped with automatic controls which will make adjustments in both transverse and longitudinal directions. The sensing device

shall be adaptable to picking up grade information from a string line, rail, ski, laser or other approved method. The paver shall be operated at a speed consistent with the delivery of plant mix which provides for a smooth uniform travel with the paver stopping only under unusual circumstances. Enough trucks shall be provided to maintain a continuous paving operation.

F. *Mixing.* After the Job Mix Formula is established, all mixtures furnished shall conform to the upper and lower specification limits determined by applying the following tolerances to the Job Mix Formula gradation. In no case shall the

No.4 (4.75 mm) sieve and larger sieves	± 7 percent
No. 8 sieve to No. 100 sieve (2.36 mm to 0.15 mm)	± 5 percent
No. 200 (0.075 mm) sieve and smaller sieves	± 3 percent
Asphalt Content	± 0.4 percent

upper and lower specification limits be outside the control points specified in Subsection 703.05:
The aggregate and asphalt shall be mixed sufficiently to provide not less than 95 percent coating when tested in accordance with Idaho T-96. The moisture content of the mixture at the time of placement shall not exceed 0.5 percent.

The combination of asphalt temperature and mixing time shall be controlled to provide the required asphalt-aggregate coating. Mixing temperature shall be determined by written recommendation of the supplier of the asphalt product used on the project.

G. *Acceptance Test Strip.* The Contractor shall be responsible for constructing an Acceptance Test Strip, in accordance with Idaho T-125, of which one test section shall be constructed using the Job Mix Formula (JMF). If the Contractor elects to construct additional test sections, the asphalt binder content of each test section must be within the asphalt content range of the mix design, which meets all requirements of Subsection 405.02. The Contractor shall submit the selected asphalt content for each additional test section to the Engineer in writing. No separate payment will be made for construction or sampling of the Acceptance Test Strip.

An Acceptance Test Strip will not be required on projects totaling less than 1.0 lane mile (1.6 lane km). Lane miles are the length (in miles) multiplied by the number of travel lanes. Compaction tests and Acceptance Test Strips are not required for plant mix leveling course or Class IV plant mix pavement.

The Contractor shall obtain a minimum of three mix samples from each test section in the presence of the Engineer and immediately submit all samples to the Engineer for testing. The samples shall be obtained in accordance with AASHTO T 168, (plate method). The sample locations will be randomly located by the Engineer within each test section of the Acceptance Test Strip in accordance with Idaho T-125.

The Contractor shall obtain a minimum of three cold feed aggregate samples and immediately submit them to the Engineer for testing.

The Contractor shall obtain a minimum of seven randomly located core samples from the compacted plant mix placed in the Acceptance Test Strip, in accordance with Idaho T-125. The random core locations will be determined by the Engineer. Coring will be observed by the Engineer and the cores shall be immediately submitted to the Engineer for testing. These cores will be used for determining the density of the compacted Acceptance Test Strip and to determine density correction factors for nuclear density equipment. Density of the cores shall be determined according to AASHTO T 166, method C (Rapid Test for Method A). Density correction factors for nuclear density equipment shall be determined according to WAQTC TM-8.

The Contractor shall repair all holes left in the pavement by the coring operation at no additional cost to the State. All repair methods and materials shall be approved by the Engineer prior to beginning coring.

The Engineer will require twenty-four hours per test section with a minimum of forty-eight hours from the time of receipt of plant mix and cores to perform acceptance testing.

Test strip acceptance will be based on the following requirements:

1. The average test results from the plant mix samples for each test section shall meet the requirements of Subsection 405.02 (the immersion compression test will not be required).

2. The average density of the cores for each test section shall be no greater than 96.0 percent and no less than 92.0 percent of the Maximum Theoretical Density as determined by AASHTO T 209.

3. The average cold feed gradations shall meet the requirements of Subsection 405.03, Part F - Mixing, for the Acceptance Test Strip. The requirements of 703.05 (sand equivalent, fracture, and flat and elongated) shall be met. The requirements for fine aggregate angularity as specified in Subsection 405.02, Materials, shall be met.

4. The average asphalt binder content for each test section shall meet the requirements of Subsection 405.03, Part F - Mixing, based on the selected asphalt content for that test section. The average percent coating and moisture content of the mixture for each test section shall meet the requirements of Subsection 405.03, Part F - Mixing.

If any of these criteria is not met for a given test section, the failed test section will be subject to rejection. If the Engineer determines the failed test section may remain in place, the Contractor may choose to leave the test section in place with a 50 percent reduction in price. If the failed test section is rejected, it shall be removed with no payment for the bid items or removal.

If the Contractor is unable to meet the contract requirements within the existing mix design asphalt content range, a new mix design meeting all contract specifications shall be furnished to the Engineer. A new Acceptance Test Strip will be placed at no additional cost to the State.

Production paving shall not begin until a test section has been accepted by the Engineer. Upon acceptance, the Plant Mix Pavement and Asphalt Binder in the test strip will be paid for under their respective items.

The Contractor shall submit the resulting Job Mix Formula that will be used during production paving to the Engineer in writing.

H. *Tack Coat.* A tack coat of asphalt shall be applied to the following surfaces in accordance with Section 401, Tack Coat:

1. Existing plant mix surfaces and to the surface of each course constructed, except the final course.

2. Surfaces of curbing, gutters, manholes, Portland cement pavement, and other structures shall be painted or sprayed with a thin, uniform tack coat of asphalt prior to the pavement being placed against them.

3. Contact surfaces of transverse joints and cold longitudinal joints just before additional mixture is placed against previously laid material.

I. *Spreading and Finishing.* The mixture shall be placed upon an approved surface. When windrowing plant mix material ahead of paver, no equipment will be allowed to cross or run on a previously placed windrow. Pavers shall be used to distribute the mixture either over the entire width or over such partial width as may be practicable. Unless otherwise directed, partial width paving shall not extend beyond one day's production.

Striping tape shall be used to temporarily mark roadway centerline on all pavement being used by traffic in accordance with Subsection 626.03.

Unless otherwise shown, the paver shall be equipped with a shoe on the outside of the paver to provide slopes as follows:

On initial pavement placement, the shoe may be 18 in. (450mm) wide for depths 0.2 ft. (60mm) or less. For depths greater than 0.2 ft. (60mm), the shoe shall be 24 in. (600mm) wide. On all pavement overlays, the shoe shall be 24 in. (600mm) wide.

J. *Compaction.* The plant mix shall be compacted by rollers as quickly as possible after placing. Section 306, Rolling, shall apply.

Rollers shall be of the steel wheel, vibratory, or pneumatic tire type, in good condition, capable of reversing without backlash, and shall be operated at speeds slow enough to avoid displacement of the mixture. The number and compactive force of rollers shall be sufficient to compact the mixture as required in this Subsection. The use of equipment which results in excessive crushing of the aggregate will not be permitted. Rollers producing pickup, wash-board, uneven compaction of the surface or other undesirable results will be rejected by the Engineer.

Rolling equipment to be used and its relative position in the compaction sequence shall be the Contractor's option, provided specification densities and

smoothness are attained. Each roller used shall be independently operated. Rolling equipment used for the Acceptance Test Strip shall be the same type and weight as will be used for subsequent compaction of the pavement. To accommodate full production, additional rollers may be required beyond the number used in construction of the Acceptance Test Strip.

Vibratory rollers shall not be operated in the vibratory mode when the internal mix temperature is less than 175°F (80°C) or when checking or cracking of the mat occurs at a higher temperature.

Breakdown rolling shall follow the paver as closely as possible. Intermediate rolling shall be performed as near as possible to the optimum temperature for compaction as determined by written recommendation of the supplier of the asphalt product used on the project. Finish rolling shall be performed at as high a temperature as is practicable and shall eliminate marks from previous rolling.

The pavement shall be compacted to a density corresponding to a range between 92.0 percent and 95.0 percent of Maximum Theoretical Density for Classes I, II, and III mix, in accordance with AASHTO T 166, Method C (Rapid Test for Method A) and T 209.

Following Acceptance Test Strip approval, pavement density testing for acceptance will be accomplished using a nuclear gauge with the readings corrected by cores in accordance with WAQTC TM-8. The Contractor shall be responsible for quality control testing.

When an Acceptance Test Strip is not required, acceptance for pavement density will be based on the average density of cores taken from the finished pavement. The Contractor shall obtain a minimum of five randomly located core samples from the compacted plant mix. Density of the cores will be determined according to AASHTO T 166, Method C (Rapid Test for Method A). The number of cores and the random core locations will be determined by the Engineer. Coring will be observed by the Engineer and the cores shall be immediately submitted to the Engineer for testing. In addition, the Contractor shall obtain a minimum of three mix samples during placement of the plant mix, in the presence of the Engineer, and immediately submit all samples to the Engineer for testing. The samples shall be obtained in accordance with AASHTO T 168 (plate method). The samples will be randomly located by the Engineer and will be tested to determine the maximum specific gravity value to be used in

computing air voids of the cores taken for density acceptance. The Contractor shall be responsible for quality control testing.

The Contractor shall repair all holes left in the pavement by the coring operation at no additional cost to the State. All repair methods and materials shall be approved by the Engineer prior to beginning coring.

Unless otherwise directed, rolling shall begin at the sides and proceed longitudinally parallel to the road centerline, with each trip overlapping one-half the roller width. When paving in echelon abutting a previously placed lane, the longitudinal joint should be rolled first, followed by the regular rolling procedure. On super elevated curves, the rolling shall begin at the low side and progress to the high side by overlapping of longitudinal passes parallel to the centerline.

Care shall be exercised in rolling not to displace the line and grade of the edges of the pavement.

To prevent adhesion of the mixture to the rollers, the wheels shall be kept properly moistened with water or water mixed with very small quantities of detergent or other approved material. Excess liquid will not be permitted. Diesel fuel, kerosene or other solvents shall not be applied to roller drums or tires to prevent adhesion of the mixture.

Along forms, curbs, headers, walls, and other places not accessible to rollers, the mixture shall be thoroughly compacted with mechanical tampers or other approved compactors. All of the mixture shall be removed from the gutter surface prior to rolling.

K. *Joints.* Rollers shall not pass over the unprotected end of freshly laid mixture unless authorized. Transverse joints shall be formed by cutting back on the previous run to expose a vertical edge the full depth of the course.

Cold transverse construction joints open to public traffic shall be sloped at 20:1. The sloped surface (ramp) shall be removed without any damage to the base just before paving is resumed. The new joint shall be tested for smoothness as described in subsection 405.03, Part N. Surface Smoothness.

End transitions between overlays and the adjoining pavement shall be constructed by milling a wedge out of the adjoining pavement, starting at the

surface and continuing into the adjoining pavement on a 200:1 slope or flatter until a vertical edge equal to 0.15 ft. (45 mm) or depth of overlay is reached. Transitions to ramps and crossroads shall be considered a transverse joint. Where the adjoining pavement is concrete, the wedge shall be considered as transverse joints, and the wedge shall be cut from the pavement to be overlaid, with the vertical edge against the concrete. Transitions between overlays and approaches shall be tapered to form a smooth transition while maintaining drainage.

Care shall be taken at longitudinal joints to provide positive bond and to provide density and a finished surface to the new mixture equal in all respects to the mixture against which it is placed. Density tests may be taken at longitudinal joints to ensure the integrity of material in the joint area. The amount of overlap of the new mix on the previously compacted pavement should be 1 to 2 in. (25 to 50 mm). Prior to rolling, the overlap shall be bumped back or trimmed back to the joint line. If the overlap is excessive, the excess material shall be trimmed off and pulled away from the new mat. Raking of material back onto the new mat shall be minimized by proper joint overlaps.

The longitudinal joint in the top course shall be at the centerline of the traveled way if the roadway is two lanes wide or at the lane lines if the roadway is more than two lanes wide. On the lower courses it shall be staggered and offset 6 in. (150 mm) to 1 ft. (300 mm) from the centerline of the traveled way if the roadway is two lanes wide or from the lane lines if the roadway is more than two lanes wide. Pavement surface across longitudinal joints shall be consistent with the transverse slope shown on typical sections.

All joints shall be tested for smoothness by the Contractor in accordance with Idaho T-87. The Contractor shall furnish and use an approved 10-foot (3 m) straight edge. The test and necessary corrections shall be completed before the material drops below 175°F (80°C).

L. *Plant Mix Leveling Course.* This work shall consist of constructing one or more leveling courses in accordance with these specifications and in reasonably close conformity with the line, grades and thickness, and typical cross section shown on the plans or as established.

A leveling course with a compacted thickness greater than 0.2 ft. (60mm) shall be placed in multiple courses.

Plant mix leveling course shall be placed on the existing surface in quantities as directed to accomplish the intended purpose. Pavers and/or motor graders and a sufficient number of pneumatic tire rollers shall be available to adequately place and compact the leveling course to the required cross section and grade. A steel wheel roller shall be provided for final rolling if the plant mix leveling course is to be used as a wearing course or if a seal coat is to be applied.

When blade laid leveling course is called for, the work shall consist of placing plant mix in wheel ruts and other surface irregularities. Plant mix shall be bladed into the low areas by a motor grader. Normally, two passes will be required to fill depressions. Each pass of the motor grader shall be followed by a pneumatic tired roller to provide compaction. Rolling shall be as directed. The blade of the motor grader shall be positioned so that light contact with the existing pavement surface is maintained. Excess coarse aggregate resulting from placing the blade laid leveling course may be disposed of along the edge of the roadway unless otherwise directed.

When machine laid leveling course is called for, the work shall consist of placing plant mix on the roadway with a paver to restore crown, super elevation, or rideability. It will be necessary to operate the screed close to the existing pavement surface. Minor surface tears from this operation will be acceptable. Both pneumatic and vibratory rolling will be as directed for compaction.

Plant mix leveling courses constructed with liquid or emulsified asphalt shall be sufficiently aerated by motor grader processing as directed prior to spreading and compacting to avoid entrapment of excessive diluents and volatiles in the leveling course. Plant mix pavement shall not be placed over leveling courses constructed with liquid or emulsified asphalt until the leveling course has cured a minimum of ten days, or longer if directed.

M. *Miscellaneous Pavement.* Miscellaneous pavement work shall consist of placing plant mix in irregular areas such as raised or depressed medians, gores, tapers, radii (excluding approach radii), and tapered paving for guardrail terminal widening. Tapers from 0 to 8 ft. (0 to 2.5 m) maximum width and gore areas from roadway shoulders to termini will be included in this item. Pavement widening for installation of guardrail will not be included in this item.

N. *Surface Smoothness.* Effective January 1, 2005, surface smoothness shall be measured using the International Roughness Index (IRI). Until that time surface

smoothness may be measured using either the Profile Index or International Roughness Index.

The pavement placed by the Contractor shall conform to the smoothness schedule defined in this section and specified in the contract.

The Contractor shall perform pre-paving (Schedule III only), quality control, and acceptance surface smoothness testing, analyze the results of this testing, and submit the results to the Engineer.

Pre-paving results shall be submitted to the Engineer prior to the start of paving. Prior to the beginning of paving the Contractor shall notify the Engineer which surface smoothness index will be used.

Quality Control results shall be submitted to the Engineer no later than the next calendar day following placement. Quality control testing may be performed using either a profilograph or profiler at the Contractor's option.

Acceptance testing results shall be performed on the final lift and submitted to the Engineer prior to any corrective action. Acceptance testing shall be completed within one (1) week of completion of paving.

At the Contractor's option, the quality control testing may be used for acceptance provide the quality control testing is verified.

All acceptance surface smoothness testing shall be verified. For profilographs, a verification block shall be used at least once for every profilograph run. The verification block shall be 3/4-inch (19 mm) thick and 75 inches (1900 mm) in length and shall be placed longitudinally in the profilograph path by the Engineer. The Engineer will note the approximate station(s) of the block placement.

For manual profilographs (those using a pen plotter linked directly to the wheel), the profilogram will be initialed by the Engineer at either the beginning or the end of the run, and at the location(s) where the verification block was placed. For all other profilographs, a documentation point shall be inserted in the file at the location of the verification block. For electronic profilographs a preliminary copy of the profilogram shall be submitted to the Engineer immediately at the end of the run.

For profilers, the profile run shall be witnessed by the Engineer and a preliminary copy of the profilogram shall be submitted to the Engineer immediately after the end of the run. Profilers shall be a Class I or Class II as defined by ASTM E 950.

Should the results of the quality control testing indicate surface smoothness is not within specifications, the Contractor shall suspend paving operations until it can be demonstrated that steps taken to modify operations will result in surface smoothness, which meets specifications.

The finished pavement shall conform to the following requirements:

1. The surface shall be tested with 10-foot a (3 m) straight-edge, at locations to be determined. When the straightedge is laid on finished pavement in a direction parallel with centerline or perpendicular to centerline, the surface shall not vary more than 1/4 in. (5 mm) from the lower edge. Any high points that cause the surface to exceed these tolerances shall be removed by grinding.

2. The surface shall be profiled in accordance with Idaho T-140 and these provisions:

Profiles shall be made 3 feet (1 m) from and parallel to the inside edge of each driving lane, and in other locations as directed, with a maximum of two profiles per driving lane.

Pavement shall conform to the following surface smoothness schedule requirements:

a. When longitudinal grade is 4.5 percent or less, pavement on tangent alignment and pavement on horizontal curves having centerline radius of curve 2,000 feet (600 m) or more shall meet the surface smoothness requirements for the smoothness schedule specified. Consecutive 0.1-mile (100 m) sections of roadway tested will be added together to obtain the mile (km) section. There will be no overlapping of either the 0.1-mile (100 m) or 1-mile (1 km) sections to change cumulative test results.

Smoothness Schedule

Profile Index:
Schedule I Projects: Target Profile Index values - 0.44 to 0.50 in/0.1 mile (7.1 to 8.0 mm/100m). Corrective action required above 0.70 in./0.1mile (11mm/100m)

Schedule II Projects: Target Profile Index values – 0.51 to 0.55 in/0.1 mile (8.1 to 8.6 mm/100m). Corrective action required above 0.70 in./0.1mile (11mm/100m)

Schedule III Projects: Target Profile Index – The smoother of 1) 50 percent improvement to the pre-paving index or 2) a maximum final index of 1.0 in/0.1 mile (16.0 mm/100m). Corrective action is required above the target profile index.

International Roughness Index (IRI):
Schedule I Projects: Target IRI values - 6.1 to 7.0 in/0.1 mile (95.1 to 110.0 mm/100m). Corrective action required above 9.5 in/0.1 mile (150mm/100m)

Schedule II Projects: Target IRI values - 7.1 to 8.0 in/0.1 mile (110.1to 125.0 mm/100m). Corrective action required above 9.5 in/0.1 mile (150mm/100m).

Schedule III Projects: Target IRI – The smoother of 1) 50 percent improvement of the pre-paving index or 2) a maximum final index of 10.0 in/0.1mile 160.0 mm/100m). Corrective action is required above the target IRI.

b. Acceptance test strips, pavement on horizontal curves having a centerline radius of curve 1,000 feet (300 m) or more but less than 2,000 feet (600 m) and pavement within the superelevation transition of such curves or any pavement with a grade greater than 4.5 percent shall be excluded from incentive/disincentive payments but shall meet the corrective action requirements for the smoothness schedule specified.

3. The following areas of pavement shall not be profiled unless otherwise specified:

   a. Pavement on horizontal curves having a centerline radius of curve less than 1000 feet (300 m) and pavement within the superelevation transition of such curves.

   b. Pavement within 50 feet (15 m) of a transverse joint that separates the pavement from a structure deck, an approach slab, or an existing pavement not constructed under the contract.

   c. Pavement for approaches and structure decks.

The profiling equipment shall be operated at a speed no greater than that recommended by the manufacturer. It shall be calibrated at the beginning of the project and as needed thereafter.

Finished pavement shall be ground until it complies with the following smoothness requirements.

Individual high points in excess of 0.3-inch within a 25 foot (8 mm within an 8 m) distance or less, as determined by measurements of the profilogram, shall be reduced by grinding, until such high points do not exceed 0.3-inch (8 mm).

After grinding has been completed to reduce individual high points in excess of 0.3-inch (8 mm), additional grinding shall be performed in sections requiring corrective action as necessary to reduce the Profile Index or International Roughness Index to the Schedule I target values specified above in any 0.1-mile (100 m) section along any line parallel with the pavement edge.

All grinding shall be done parallel to centerline. Adjacent grinder passes, within any one ground area, shall be extended to produce a neat rectangular area having a uniform surface appearance. At transverse boundaries between ground and unground areas, smoothly feathered transitions shall be made. After grinding has been completed, the ground pavement surface shall receive a fog coat in accordance with Section 408 – Fog Coat.

The grinding equipment shall be a power-driven machine that is specifically designed to smooth Portland cement concrete pavement with diamond blades.

The effective wheelbase of the machine shall not be less than 12 foot (3.6 m) and cutting width shall be at least 3-foot (900 mm). In lieu of diamond grinding, a self propelled milling machine of the type used for removal of asphalt pavement may be used provided a special milling head is used that is designed to provide a texture similar to diamond grinding. The cutting teeth on the milling head shall have a maximum spacing of 0.3-inch (7 mm). The forward speed of the machine is restricted to 10-feet (3 m) per minute while milling. Should the texture produced by milling be unsatisfactory diamond grinding shall be required. Grinding or milling equipment shall be of a shape and dimension that does not encroach on traffic movement.

The Contractor shall check the pavement for smoothness after grinding, in accordance with the requirements of this Subsection, and shall make any additional corrections necessary to the pavement to achieve smoothness. The Contractor shall submit a graph chart evaluated in accordance with Idaho T-140 showing compliance of the final surface to the smoothness requirements.

The cost of such grinding or milling, and all related work such as fog coat, disposal of milled material, traffic control, flagging, profiling, surface repair of ground or milled areas, and temporary striping shall be at the Contractor expense.

405.04 Method of Measurement. Plant mix pavement and asphalt will be measured by the ton (metric ton). Batch weights will not be permitted as a method of measurement. The plant mix quantity shall be the weight used in the accepted pavement and shall include the weight of the aggregate, asphalt, and any additives in the mixture.

Anti-stripping additive will be measured by the percentage of additive per ton (metric ton) of asphalt (TOA, Metric Ton of Asphalt, MTOA).

Miscellaneous pavement will be measured by the square yard (square meter). Final measurement will be based on plan quantities unless these quantities are significantly altered by authorized changes. Such payment is to be in addition to the cost of asphalt and plant mix material.

Approaches will be measured per each, regardless of width or length. Such measurement will be in addition to the measurement of asphalt and plant mix material. Separate mailbox turnouts will be measured as an approach. Mailbox turnouts adjacent to an approach shall be considered as part of the approach and no

separate measurement will be made. Such measurement will be in addition to the measurement of asphalt and plant mix material.

Wedge milling for the transition section will be measured by the square yard (square meter).

405.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Plant Mix Pavement Class ____	Ton (t)
Plant Mix Pavement (including asphalt and additives) Class ____	Ton (t)
Plant Mix Leveling Course Class ____	Ton (t)
Plant Mix Leveling Course (including asphalt and additives) Class ____	Ton (t)
Recycled Plant Mix Pavement Class ____	Ton (t)
Recycled Plant Mix Pavement (including asphalt and additives) Class ____	Ton (t)
_____Asphalt Cement for Plant Mix	Ton (t)
_____Liquid Asphalt for Plant Mix	Ton (t)
_____Emulsified Asphalt for Plant Mix	Ton (t)
_____Percent Anti-stripping Additive for Plant Mix	TOA (MTOA)
Miscellaneous Pavement	SY (m^2)
Approaches	Each
Wedge Milling	SY (m^2)

The cost to produce the required aggregate in each stockpile to accommodate blends shall be included in the cost of plant mix.

No separate payment will be made for asphalt and additives for such bid items as "Plant Mix Pavement (including asphalt and additives) Class __." The percentage of asphalt in the mix shall be in accordance with the mix design (Job Mix Formula). An adjustment in the total amount paid for the bid item shall be made after the pavement is complete. The adjustment will be based on the invoice price of asphalt and additives used and the percent of asphalt and additives shown on the plans under "Estimating Basis." The adjustment shall cover only the increase or decrease from the specified value. Said adjustment shall not apply to contractor furnished sources.

For each smoothness evaluation section the Contractor is entitled to an incentive payment excluding acceptance test strips and Schedule III surface smoothness projects. An evaluation section is defined as a 0.1 mile (100m) per traffic lane; or fraction thereof as applicable. The incentive payment will not be paid for pavement on the roadway shoulders, center turn lanes, turn bays, crossovers, tapers or other miscellaneous pavement. The incentive payment will be paid in accordance with the following schedule:

Profile Index
English Schedule

Payment $ per 0.1 mi.	**Initial Index in/0.1 mile section Schedule I**	**Schedule II**
$500	0.29 or less	0.32 or less
$300	0.30 to 0.35	0.33 to 0.43
$100	0.35 to 0.43	0.44 to 0.50
$ 0	0.44 to 0.50	0.51 to 0.55
-$100	0.51 to 0.55	0.56 to 0.60
-$300	0.56 to 0.60	0.61 to 0.70
-$500	0.61 to 0.70	
-$300 and corrective action	0.71 or greater	0.71 or greater
-$300 and corrective action	individual high points	individual high points

Metric Schedule

Payment $ per 100m	**Initial Index mm/100m section Schedule I**	**Schedule II**
$310	4.5 or less	5.0 or less

$190	4.6 to 5.5	5.1 to 7.0
$60	5.6 to 7.0	7.1 to 8.0
$ 0	7.1 to 8.0	8.1 to 8.6
-$60	8.1 to 8.6	8.7 to 9.6
-$190	8.7 to 9.6	9.7 to 11.0
-$310	9.7 to 11.0	
-$190 and corrective action	11.1 or greater	11.1 or greater
-$300 and corrective action	individual high points	individual high points

International Roughness Index

English Schedule

Payment $ per 0.1 mi.	**Initial Index in/0.1 mile section Schedule I**	**Schedule II**
$500	4.0 or less	4.5 or less
$300	4.1 to 5.0	4.6 to 6.0
$100	5.1 to 6.0	6.1 to 7.0
$ 0	6.1 to 7.0	7.1 to 8.0
-$100	7.1 to 7.5	8.1 to 8.5
-$300	7.6 to 8.5	8.60 to 9.5
-$500	8.6 to 9.5	
-$300 and corrective action	9.6 or greater	9.6 or greater
-$300 and corrective action	individual high points	individual high points

Metric Schedule

Payment $ per 100m	**Initial Index mm/100m section Schedule I**	**Schedule II**
$310	63.0 or less	71.0 or less
$190	63.1 to 79.0	71.1 to 95.0
$60	79.1 to 95.0	95.1 to 110.0
$ 0	95.1 to 110.0	110.1 to 125.0
-$60	111.0 to or greater	125.1 to 135.0
-$190	120.0 to or greater	135.1 to 150.0
-$310	135.0 to 150.0	
-$190 and corrective action	150.1 or greater	150.1 or greater
-$300 and corrective action	individual high points	individual high point

Only one incentive payment will be made per evaluation section. The evaluation sections shall run consecutively from the point paving begins to the point paving is interrupted as shown on the plans such as at bridges, the end of lane paving or areas specifically excluded by the specifications.

Incentives will be based on initial profiles prior to any corrective work on the top course of paving.

SECTION 406 - ROAD MIX PAVEMENT

406.01 Description. This work shall consist of constructing one or more courses of road mix pavement on a prepared base or road surface in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established.

406.02 Materials. Asphalt shall be of the type and grade called for in the contract. The grade may be changed one step by the Engineer at no change in unit price.

Asphalt and anti-stripping additive, if required, shall meet the applicable requirements of Section 702, Asphalt. The asphalt will be accepted at point of delivery.

Aggregate shall meet the applicable requirements of Section 703, Aggregates. The aggregate will be accepted at the crushing plant except for material from Contractor furnished sources which will be accepted at the point of delivery.

406.03 Construction Requirements.

A. Season and Moisture Limitations. Asphalt shall not be applied when surface or weather conditions prevent proper construction.

Road mix pavement construction will not be permitted prior to May 15, or after September 15, except when authorized in writing.

The aggregate to be treated or the mixed material before laying shall not contain more than 2 percent moisture. If the moisture exceeds this percentage, processing and drying shall continue until the moisture is reduced below 2 percent.

If emulsified asphalt is used, the above aggregate moisture content requirements do not apply.

The equipment used shall include scarifying, mixing, spreading, finishing and compacting equipment; an asphalt distributor; and equipment for heating the asphalt.

The distributor shall be so designed, equipped, maintained and operated that asphalt may be applied uniformly on variable widths of surface at readily determined and controlled rates with uniform pressure. Distributor equipment shall include a tachometer, pressure gages, accurate volume measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump, and full circulation spray bars adjustable vertically.

Rollers shall meet the requirements of Section 306, Rolling.

B. *Preparation of Roadbed.* The roadbed shall be brought to a uniformly compacted surface. The prepared base shall be kept in repair at all times in advance of placing the bituminous surface course.

If a prime coat is applied, it shall be left undisturbed not less than 24 hours. If the asphalt fails to penetrate, and the roadway must be used by traffic, blotter shall be spread in the amount directed to absorb the excess asphalt.

If a tack coat is applied, it shall be allowed to dry until it is in the proper condition of tackiness to receive the road mix material.

C. *Placing Aggregate.* Aggregate shall be uniformly spread on the road by the use of spreader boxes or other approved mechanical spreading devices.

D. *Application of Asphalt.* The asphalt shall be uniformly distributed in successive applications, in such amounts and at such intervals, as directed. The mixing equipment shall follow immediately behind the distributor after each application of asphalt to partially mix the aggregate and the asphalt. The asphalt application temperature shall be as specified in Section 400.

E. *Mixing.* After the last application of asphalt and partial mixing, the entire mass of asphalt and aggregate shall be windrowed on the road surface and then mixed until all aggregate particles are coated with asphalt, the whole mass has a uniform color, and the mixture is free from fat or lean spots, balls, or uncoated particles.

During the mixing operations, care shall be taken to avoid cutting into the underlying course or contaminating the mixture with earth or other extraneous matter. When directed, the mixing process shall be confined to part of the width or area of the road so as to allow traffic to pass.

Should the mixture show an excess, deficiency, or uneven distribution of asphalt, the condition shall be corrected by the addition of aggregate or asphalt as required, and remixing. If the mixture contains excessive amounts of moisture or volatile matter, it shall be bladed, aerated, or otherwise manipulated until the moisture and volatile contents are satisfactory. The spreading of the mix shall not be done when the surface to be covered is in unsatisfactory condition.

At the end of each day's work, or when the work is interrupted by weather conditions or otherwise, all loose material shall be bladed into a windrow whether mixing is completed or not, and shall be retained in a windrow until operations are resumed.

F. *Spreading, Compacting, and Finishing.* The material shall be spread by a patrol or a mechanical spreader of approved type. In spreading from the windrow, care shall be taken to avoid cutting into the underlying base.

After the material is spread, the surface shall be rolled. Initial rolling shall be performed with a pneumatic-tire roller and final rolling with a 3-wheel or tandem-type steel-wheel roller. Rolling shall be parallel to the road centerline and shall commence at the outer edges of the road, overlapping the shoulders and progress toward the center, overlapping on successive passes by at least one-half the width of the roller, except that on superelevated curves rolling shall progress from the lower to the upper edge. Each pass shall terminate at least 3 ft. (1 m) in advance or to the rear of the end of the preceding pass. During the compaction, the surface shall be bladed as necessary to fill ruts and to remove incipient corrugations or other irregularities. Rolling shall continue until the surfacing is of uniform texture and satisfactory compaction obtained.

G. *Surfacing Approaches.* Road mix pavement shall be constructed on approaches as shown on the plans or as directed.

H. *Surface Smoothness.* The completed surface will be tested in accordance with Idaho T-87. The surface shall not vary more than 1/4 in. (5 mm) from a 10 ft. (3 m) straightedge.

I. *Aggregate for Road Mix Pavement in Stockpile.* This work shall consist of furnishing aggregate material meeting these specifications in stockpiles at designated locations.

The stockpile site shall be prepared by clearing and smoothing as directed. Stockpiles shall be neat and regular in form and shall occupy as small an area as possible. They shall be constructed by first distributing the material to be stockpiled over the entire base and building upward in successive layers not more than 3 ft. (1 m) in depth. End dumping or conveying of materials over the sides of the pile will not be permitted.

406.04 Method of Measurement. Aggregate and asphalt for road mix pavement will be measured by the ton or cubic yard (metric ton or cubic meter). Anti-stripping additive will be measured by the percentage of additive per ton (metric ton) of asphalt.

Approaches will be measured by the number paved regardless of size. The paving materials used will be included and paid for in the quantities of material for their respective items.

406.05 Basis of Payment. Payment for acceptable work will be made as follows:

Pay Item	Pay Unit
_____Aggregate for Road Mix Pavement	Ton (t)
Approaches	Each
_____Aggregate for Road Mix Pavement in Stockpile	Ton or CY (t or m^3)
_____Aggregate for Road Mix Pavement, Load, Haul and Place	Ton (t)
_____Liquid Asphalt for Road Mix Pavement	Ton (t)
_____Emulsified Asphalt for Road Mix Pavement	Ton (t)
_____Percent Anti-Stripping Additive for Road Mix Pavement	TOA (MTOA)

SECTION 407 - SCRUB COAT

407.01 Description. This work shall consist of constructing a scrub coat on the road surface in accordance with the plans and these specifications or as established.

407.02 Materials. Asphalt shall be of the type and grade called for in the contract. Asphalt and anti-stripping additive, if required, shall meet the applicable requirements of Section 702, Asphalt. The asphalt will be accepted at the point of delivery.

The aggregate for scrub coat shall meet the aggregate requirements of Subsection 703.05 unless otherwise provided.

The aggregate need not be separated. The aggregate will be accepted at the crushing plant except for material from Contractor furnished sources which will be accepted at the point of delivery.

407.03 Construction Requirements.

A. *General.* Scrub coat material shall not be placed on wet or frozen surfaces. Scrub coat material shall not be placed unless the ambient and surface temperature is 60°F (16°C) and rising. When directed, the surface shall be cleaned by brooming or other approved methods.

B. *Mixing.* The mixing of plant mix scrub coat shall conform to Subsection 405.03. The mixing of road mix scrub coat shall conform to Subsection 406.03. Mixtures shall be produced at the lowest temperature that will produce a uniform workable mixture not exceeding is 165°F (75°C).

C. *Equipment.* The rollers shall meet the requirements of Section 306, Rolling. Rollers shall be operated at speeds slow enough to avoid displacement of the mix.

D. *Spreading, Compacting, and Finishing.* The tack coat shall be applied in accordance with Section 401, Tack Coat before applying the scrub coat.

The scrub coat material shall be sufficiently aerated prior to spreading. It shall be spread and tight bladed from shoulder to shoulder or as directed. Depressions, irregularities and cracks shall be filled and smoothed to create a uniform surface. Rolling with pneumatic-tire rollers will be done concurrently with the spreading. Finish rolling will be done with a steel-wheel roller unless otherwise directed.

Traffic shall be routed over the completed section for a minimum of 10 days prior to placing the subsequent course. A period shorter than 10 days may be approved by the Engineer if conditions warrant.

407.04 Method of Measurement. Scrub coat, asphalt and anti-stripping additive, if required, will be measured by the ton (metric ton). Batch weights will not be permitted as a method of measurement.

The plant mix scrub coat quantity shall be the weight used in the accepted pavement and no deduction will be made for the weight of the asphalt or other additives in the mixtures.

Anti-stripping additive will be measured by the percentage of additive per ton (metric ton) of asphalt.

407.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
____ Plant Mix Scrub Coat	Ton (t)
____ Aggregate for Road Mix Scrub Coat	Ton (t)
____ Liquid Asphalt for Scrub Coat	Ton (t)
____ Emulsified Asphalt for Scrub Coat	Ton (t)
____ Percent Anti-Stripping Additive for Scrub Coat	TOA (MTOA)
____ Plant Mix Scrub Coat (including asphalt and additives)	Ton (t)

No separate payment will be made for asphalt and additives for such bid items as Plant Mix Scrub Coat (including asphalt and additives). For bidding purposes, the asphalt and additive content will be shown in the plans under Estimating Basis. The percentage of asphalt in the mix shall be as directed. An adjustment in the total amount paid for the bid item will be made after the pavement is complete. The adjustment will be based on the invoice price of asphalt and additives used and the percent of asphalt and additives shown on the plans under Estimating Basis. The adjustment shall cover only the increase or decrease from the specified value.

SECTION 408 - FOG COAT

408.01 Description. This work shall consist of applying a fog coat, and blotter if required, in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or as established.

408.02 Materials. Fog coat material shall be diluted emulsified asphalt. The emulsified asphalt shall meet the applicable requirements of Section 702, Asphalt.

When diluted emulsified asphalt is specified, approximately equal volumes of emulsified asphalt and water shall be mixed prior to application.

Blotter material shall meet the applicable requirements of Section 703, Aggregates, and will be accepted in stockpile at the source except for material from Contractor furnished sources which will be accepted at the point of delivery.

408.03 Construction Requirements.

A. *Equipment.* The Contractor shall provide equipment for applying the fog coat material and for applying blotter. The equipment shall meet the requirements of Subsection 406.03.

B. *Application of Fog Coat.* Fog coat material shall be applied by means of a pressure distributor in a uniform, continuous spread. The distributor shall not exceed 25 mph (40 km/h). Care shall be taken to ensure that application of material at the junction of spreads is not in excess of the specified amount. Skipped areas or deficiencies shall be corrected.

The quantities, rate of application and temperature of the fog coat material shall be approved before applying the fog coat.

The fog coat shall not be applied when surface or weather conditions would prevent proper construction.

The fog coat shall be applied in such manner as to offer the least inconvenience to traffic and to permit one-way traffic without pickup or tracking.

Fog coat placed over a seal coat shall be placed within one working day of the completed seal coat, or as conditions allow.

C. *Application of Blotter.* If, after the application of the fog coat, the material fails to penetrate and the roadway must be used by traffic, blotter shall be spread in the amount directed to absorb the excess asphalt.

408.04 Method of Measurement. Diluted emulsified asphalt will be measured by the gal. (liter) after dilution with no correction for temperature.

Blotter will be measured by the ton or cubic yard (metric ton or cubic meter).

408.05 Basis of Payment. Payment for accepted work will be as follows:

Pay Item	**Pay Unit**
Diluted Emulsified Asphalt for Fog Coat	gal. (L)
Blotter	Ton or CY (t or m^3)

SECTION 409 - PORTLAND CEMENT CONCRETE PAVEMENT

409.01 Description. This work shall consist of a pavement composed of Portland cement concrete constructed in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established. The Contractor shall submit a proposed mix design to the Engineer for review. The Engineer will review the mix design for compliance with specifications.

A. *Classification.* The materials for concrete shall be proportioned to produce a workable concrete mix that conforms to the following parameters.

TABLE A

BASIC MIX DESIGN PARAMETERS

Concrete Class in 100 psi (MPa) (28 Day) (a)(b)	Minimum Cement Content Lb./CY (kg/m³) (c)	Max. Water Cement Ratio	Slump in. (mm)	Air Content Percent
45 (31.0)	660 (392)	0.44	2 in. (50 mm) max.	4-7

(a) The class of concrete is the specified compressive strength when tested in accordance with applicable tests listed in Subsection 409.02, Materials.
(b) A design value of 5600 psi (38.5 Mpa) is specified to achieve the specified compressive strength.
(c) It may not always be possible to produce concrete of the required strength using the minimum cement content. No separate payment will be made for additional cement required to meet the specified strength.

TABLE B

BASIC MIX DESIGN PARAMETERS

WHEN FLY ASH IS REQUIRED

Concrete Class in 100 psi (MPa) (28 Day) (a)(b)	Minimum Cement Content Lb./CY (kg/m³) (c)	Minimum Fly Ash Content Lb./CY (kg/m³) (c)(d)(e)(f)	Max. Water Cement (Plus Fly Ash) Ratio	Slump in. (mm)	Air Content Percent
45 (31.0)	550 (326)	138 (82)	0.42	2 in. (50 mm) max	4-7

(a) The Class of concrete is the specified compressive strength when tested in accordance with applicable tests listed in Subsection 409.02, Materials.

(b) A design value of 5600 psi (38.5 Mpa) is specified to achieve the specified compressive strength.

(c) It may not always be possible to produce concrete of the required strength using the minimum cement and fly ash contents. If additional cement and fly ash are needed to meet strength requirements, they shall be added at the ratio of 1 lb. (0.45 kg) fly ash per 4 lb. (1.8 kg) cement. No separate payment will be made for additional cement and fly ash required to meet minimum acceptable compressive strength.

(d) Class F fly ash shall be used.

(e It may not always be possible to produce concrete using the minimum fly ash content that will ensure mortar bar expansion does not exceed 0.10 percent expansion when tested in accordance with AASHTO T 303. If additional fly ash is needed to meet mortar bar expansion requirements, it may be added without a corresponding increase in cement provided the strength requirements are met. Lithium or other mitigating measures may be required, as approved by the Engineer, in order to comply with this requirement.

(f) Fly ash shall not exceed 25 percent of the total cementicious material (fly ash + cement).

B. *Acceptance*. Acceptance of concrete is based on conformance with all parameters specified for paving concrete. Acceptance of strength will be determined from the results of 28 day compressive strength tests performed in conformance with Subsection 409.02 on cylinders made from samples of the concrete being placed. Average strength from three companion cylinders will be considered as one test.

Should the 28 day strength for any test for paving concrete fall below the specified strength, the concrete represented by the test shall be subject to rejection or price adjustment if allowed to remain. Concrete subject to rejection or price adjustment shall be that represented by the test that falls below the specified strength.

Paving concrete which fails to meet the specified strength may be accepted at a reduced price provided the strength is not more than 10 percent below the specified strength. Concrete represented by tests falling more than 10 percent below specified strength is subject to rejection.

Unacceptable concrete shall be removed at the Contractor's expense.

The price adjustment for paving concrete which fails to meet the specified strength, but is allowed to remain in place, shall be in accordance with the following table:

Percent of Specified Strength	**Pay Factor**
100 and above	1.00
95 and below 100	0.90
90 and below 95	0.80
below 90	Subject to rejection.*

*If allowed to remain in place, as determined by the Engineer, the Pay Factor will be 0.50.

The quantity of acceptable concrete will be paid for at the contract unit price multiplied by the pay factor as determined above.

Concrete subject to price adjustment or rejection, may be core drilled as an alternative test for acceptance. Cost of obtaining and testing such core samples shall be borne by the Contractor. The location and number of the cores will be determined by the Engineer and coring and testing will be witnessed by the Engineer. The Contractor shall repair all holes left by the coring operation at no additional cost to the State. All repair methods and materials shall be approved by the Engineer prior to beginning repairs.

If the Contractor obtains cores following notification of failing strength in sufficient time for such cores to be tested prior to the lapse of a 42 day time limit from the time of placement, the 28-day strength of the concrete placed and represented by the drilled core samples shall be determined as the average of the test results of the drilled cores. If, however, the Contractor delays in obtaining core samples for strength determination, they will be acceptable to the Engineer for testing only when the Contractor submits a correlation curve developed by an approved independent testing laboratory to relate strength at the actual test age to 28-day strength for the particular class and design mix represented by the cores. When the Contractor elects to supply drilled cores and submits acceptable drilled cores as described above, to the Engineer for testing, both the Contractor and State shall accept the results of the tests of the drilled cores in lieu of the results on the test cylinders.

Such cores shall be obtained and tested in accordance with AASHTO T 24 except that the cores shall be protected from moisture gain or loss and shall be tested as soon as possible without further conditioning other than preparation of the ends, if such preparation is needed. At least three representative cores shall be taken from each area of in-place concrete that is considered potentially deficient. If, before testing, one or more of the cores shows evidence of having been damaged subsequent to or during removal, it shall be replaced with a new core. Tests performed on cores taken from the work may include, but are not limited to, compressive strength, cement content by ASTM C 1084, and petrographic analysis by ASTM C856 (including water cement ratio and air content.)

If the average strength of the cores from paving concrete is less than the specified strength for the area represented, the concrete shall be removed or accepted at a reduced price, as specified above.

Should concrete used in the work fail to conform to the specified compressive strength, the Contractor shall, at his expense, make corrective changes in the materials mix portions, concrete fabrication procedures, or other corrective action before continuing. If results of 7- day strength tests are low or indicate a downward trend, predicting concrete may not meet the specified 28- day strength, corrective changes shall be made. Changes will be subject to written approval of the Engineer.

409.02 Materials. Materials shall meet the requirements of the following Sections or Subsections:

Portland Cement	701
Aggregate	703
Joint Fillers and Sealers	704
Silicone Joint Sealant	704.05
Reinforcing Steel	708.02
Dowel Bars	708.03
Tie Bars	708.04
Membrane-Forming Curing Compound	709.01
Air Entraining Admixtures	709.03
Set Retarding Admixtures	709.04
Water Reducing Admixtures	709.05
Water	711.01

Epoxy- Resin- Base Bonding Systems 711.14
Fly Ash.....714

The point of aggregate acceptance will be at the concrete mixing plant.

Admixtures shall be approved before use.

An aggregate correction factor for the concrete aggregate shall be determined for each mix design. The aggregate correction factor shall be determined in accordance with AASHTO T 152 and submitted with the mix design.

Testing shall be in accordance with the following standard methods:

Compressive Strength of Cylindrical Concrete Specimens .....AASHTO T 22

Making and Curing Concrete Test Specimens in the Field .....AASHTO T 23
(Except cylinders shall be molded only in 6 in. dia. X 12 in. (150 mm dia. X 300 mm) single use molds made of plastic.)

Obtaining and Testing Drilled Cores and
Sawed Beams of Concrete .....AASHTO T 24
(Provisions of AASHTO T 24 relating to ASTM and ACI references do not apply unless otherwise specified)

Slump of Hydraulic Cement Concrete .....AASHTO T 119

Mass Per Cubic Meter (Cubic Foot), Yield, and Air Content (Gravimetric) of Concrete .....AASHTO T 121
Including cement content.

Making and Curing Concrete Test Specimens
in the Laboratory.....AASHTO T 126
(Except cylinders shall be molded only in 6 in. dia. X 12 in. (150 mm dia. X 300 mm) single use molds made of plastic.)

Measuring Length of Drilled Concrete Cores .....AASHTO T 148

Air Content of Freshly Mixed Concrete by the
Pressure Method .....AASHTO T 152

Measuring Texture Depth of Portland Cement Concrete
Using a Tire Tread Depth Gage .....AASHTO T 261
(modified)
(Provisions of AASHTO T 261 relating to calculations, reporting, and subdividing into sublots do not apply unless otherwise specified)

Pavement Straightedge Procedures .....Idaho T-87

Standard Method of Operation of the California Profilograph
and Evaluation Profiles.....Idaho T-140

Method of Testing Thickness of Plastic Concrete Pavement .....Idaho T-130

Determination of the Rate of Evaporation of
Subsurface Moisture From Concrete .....Idaho T-133

Determining the Percentage of Fracture of
Coarse Aggregate .....AASHTO TP-61
Method 1

Sampling Freshly Mixed Concrete.....WAQTC TM-2

Accelerated Detection of Potentially Deleterious
Expansion of Mortar Bars Due to Alkali-Silica Reaction……AASHTO T 303

Temperature of Freshly Mixed Portland Cement Concrete .....AASHTO T 309

409.03 Construction Requirements.

A. *Proportioning.* Concrete mix design is the Contractor's responsibility, and shall include making and testing compressive strength specimens, which may be done in the Contractor's laboratory or by an approved independent laboratory. Each mix design submitted by the Contractor shall be uniquely identified. The proposed mix design; copies of all test reports, data, and worksheets; and samples of the proposed aggregate, cement, fly ash and admixtures, shall be

furnished to the Engineer at least 60 days in advance of proposed use. The mixing water source and proposed curing compound shall also be identified at least 60 days in advance. Concrete production shall not start until the mix design is confirmed by the Central Materials Laboratory.

Proposed mix designs shall contain no more than 40 percent fine aggregate by weight of total aggregate. Coarse aggregate shall be angular. Angular aggregate is defined as having greater than 40 percent fractured faces. Fracture will be based on the aggregate particles retained on the No. 4 (4.75 mm) sieve with one or more fractured faces as determined by AASHTO TP-61, Method 1.

Laboratory produced and cured specimens based on the mix design shall have a compressive strength (average of three specimens) not less than 5600 psi (38.5 Mpa) at 28 days. In addition to strength, the air content and slump shall be reported. Strength data is valid only if air content, slump, and water-cement ratios are within required limits for the specified mix class.

Laboratory specimens, produced in accordance with AASHTO T 303, shall be required using the cement, fly ash, and other mitigative additives proposed for use in the mix design. Expansion of mortar bars shall not exceed 0.10 percent with the addition of fly ash, lithium, or other additives.

Number 4 coarse aggregate shall be used unless otherwise approved. Exact proportions will be based upon trial mixes with the materials to be used in the work, and will be so adjusted as to use the minimum quantity of sand necessary to produce concrete with the required workability and strength.

When fly ash concrete is required by the contract, the mix design shall conform to Subsection 409.01, Part A, Classification, Table B – Fly Ash Concrete.

When the contract does not require fly ash, the Contractor may elect to use it subject to the same requirements as when the contract requires fly ash.

Whenever fly ash is used, the same fly ash source (power plant), cement source (mill), and cement type shall be used throughout the project in any individual mix design unless a change is approved by the Engineer. Approval for a change may only be given upon submission of lab test reports by the Contractor to verify that the revised mix design meets all specification requirements.

If a slipform concrete paver is not used to construct concrete pavement, the slump range may be 3.5 in. (90 mm) maximum to allow hand finishing.

For concrete medians and other non traveled surfaces, the maximum slump may be increased to 4.5 in. (115 mm) with a permissible 5 percent reduction in 28-day compressive strength.

B. *Equipment*.

1. *Mixers and Hauling Equipment*.

a. Mixers and Agitators and non-agitating hauling equipment. Mixers may be stationary mixers or truck mixers. Agitators may be truck mixers or truck agitators. Truck mixers and agitators shall be equipped with means by which the number of revolutions of the drum, blades, or paddles may be readily verified. Each mixer and agitator shall have attached thereto by the manufacturer, a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the volume of the drum, the capacity of the drum or container in terms of the volume of mixed concrete, and the speed of rotation of the mixing drum or blades. Plates shall be in accordance with NRMCA standards. Stationary mixers shall be equipped with an acceptable timing device that will not permit discharge until the specified mixing time has elapsed. Truck mixers shall be equipped with a calibrated water flow meter or other approved measuring device to control the amount of mixing water added in the field.

b. The mixers, when loaded to the rated mixing capacity and the concrete mixed for the time or revolutions prescribed, shall combine the ingredients of the concrete into a thoroughly mixed and uniform mass and discharge the concrete with satisfactory uniformity, as specified in Subsection 409.03, Part D, *Mixing and Delivery.*

c. The agitators, when loaded to rated capacity, shall maintain the mixed concrete in a thoroughly mixed and uniform mass and discharge the concrete with a satisfactory degree of uniformity as indicated in Subsection 409.03, Part D, *Mixing and Delivery.*

d. The bodies of non-agitating equipment shall be smooth, mortar-tight metal containers capable of discharging the concrete without segregation.

2. *Paving Equipment*. Pavement shall be constructed using only that paving equipment which uniformly spreads at the proper thickness for the width of the area being paved, consolidates the freshly placed concrete and produces a finished surface meeting straightedge and Profile and Index requirements of Subsection 409.03, Part K, *Surface Test*, before grinding. Failure to consistently produce pavement meeting these parameters shall constitute cause for suspending concrete paving operations until the deficiencies or malfunction is corrected.

The paving machines shall be self-propelled and conform to the following (unless otherwise approved):

a. The Placer/Spreader shall:

Receive the concrete mixture into its hopper(s) adjacent to the area to be paved.

b. The Slipform paver shall be:

Equipped with automatic screed control mechanisms and operate from stringlines erected near both the right and left side of the machine. After the stringlines are established, the contractor, with the Engineer as observer, shall check the indicated depth of placement at 50 ft. (15 m) intervals to achieve the design thickness between the outside edges.

The concrete shall be vibrated with internal vibrators. The rate of vibration shall not be less than 3500 vibrations per minute for surface vibrators and 8000 to not more than 12,000 vibrations per minute for internal vibrators. The Contractor shall furnish a tachometer or other suitable device for measuring and indicating the actual frequency of vibrations.

Vibrators shall not rest on new pavements or side forms. Power to the vibrators shall be so connected that vibration will cease when the forward or backward motion of the machine is stopped.

c. Machine Paving with Forms:

Machine Paving with Forms may be used for finishing concrete pavement in small irregular areas in lieu of slipform pavers upon approval of the Engineer. Machine Paving with Forms shall meet the requirements of Subsection 411.03.

d. Bridge Deck Machine:

An approved concrete bridge deck finishing machine may be used for finishing concrete pavement in small irregular areas in lieu of slip-form pavers. Paving with a Bridge Deck Machine shall meet the requirements of Subsection 502.03.

All finishing and surface test specifications shall apply equally to any method of placement.

3. Concrete Sawing Equipment. The Contractor shall provide a minimum of three production saws, including one standby unit, of adequate power to perform the work. Unless otherwise provided or allowed, all saws shall be multiple arbor, multiple blade gang saws. All saws operated on 3 to 4 hour old pavement (nonrigid) shall be work bridge mounted so the machine weight is not placed on the new concrete. The Contractor shall provide adequate artificial lighting facilities for night sawing. All of this equipment shall be maintained in good working order and shall be on the job before and continuously during concrete paving operations. An ample supply of saw blades shall be maintained at the site of the work at all times during the sawing operations. Paving will not be allowed until concrete sawing equipment is on site and ready for use.

C. *Handling, Measuring and Batching Materials.* The production of concrete, meeting the approved mix design, is the responsibility of the Contractor.

The proportion of the ingredients for each batch shall be submitted to the Engineer at the time of batching.

Changes to the mix design must be requested and approved, but minor adjustments due to varying moisture in the aggregates and minor adjustments of approved admixtures are not considered changes in the mix design and will

not require approval of a new mix design. Minor adjustments shall be reported to the Engineer prior to batching.

1. Cement shall be measured by weight or by number of sacks. When measured by weight, cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until released for discharge. The cement hopper shall be attached to a separate scale for individual weighing or shall be attached to the aggregate scale for cumulative weighing. If cement is weighed cumulatively, it shall be weighed before the other ingredients. The scale and weigh hopper for cement shall be separate and distinct from aggregate weighing equipment. Cement batchers shall be provided with a dust seal between the charging mechanism and hopper, installed in such a way as not to affect the weighing accuracy and vented to permit the escape of air. The hopper shall be self cleaning and fitted with means to assure complete discharge. Sufficient wind protection shall be provided to prevent interference with batching accuracy. When cement is measured in sacks, no fraction of a sack shall be used unless weighed. The cement, as weighed, shall be within one (1) percent of the design weight.

2. Aggregates shall be measured by weight. The individual aggregates, as weighed, shall be within two (2) percent of the required weights and the total weight of the aggregate shall be within two (2) percent of the required weight. Aggregates shall be handled from stockpiles or other sources to the batching plant in such a manner as to maintain a uniform grading and stable moisture content of the material. All aggregates produced or handled by hydraulic methods and washed aggregates shall be stockpiled or binned for draining at least 12 hours before being batched.

3. Water shall be measured by volume or by weight. The measuring device shall be so arranged that the measurements will not be affected by variable pressures in the water supply line. Wash water shall not be used as a portion of the mixing water. Water, as weighed or measured, shall be within one (1) percent of the required amount.

4. Fly ash shall be measured by weight. The fly ash, as weighed, shall be within one (1) percent of the design weight.

5. Dry admixtures shall be measured by weight, and paste or liquid admixtures by weight or volume. Admixtures used in small quantities in proportion to the cement, as air entraining admixtures, shall be dispensed with the mixing water. Any adjustments to the amount of admixtures used shall be in accordance with manufacturer's recommendations. The quantities of admixtures used shall be within three (3) percent of the required amount. If more than one admixture is used, they shall conform to the requirements of Subsection 709.02, Concrete Admixtures General.

D. *Mixing and Delivering*.

1. Concrete shall be mixed and delivered by means of any of the following:

   a. Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in agitating equipment or in nonagitating equipment when approved. (Known as central mixed concrete.)

   b. Mixed completely in a truck mixer at the batching plant or while in transit. (Known as transit mixed concrete.)

   c. Mixed completely in a truck mixer at the point of delivery following the addition of mixing water. (Known as truck mixed concrete.)

   d. Mixed partially in a stationary mixer, and the mixing completed in a truck mixer. (Known as shrink mixed concrete.)

   e. Mixed in an approved mixer which volumetrically measures the concrete ingredients and continuously produces concrete which meets the requirements of ASTM C 685.

2. Truck mixers and truck agitators shall be operated within the rated capacity, and at a speed of rotation for mixing or agitating, as designated by the manufacturer of the equipment.

3. When a stationary mixer is used for the complete mixing of the concrete, the mixing time for mixers having a capacity of 10 CY (8 m^3) or less shall be 50 seconds minimum. For 10 CY (8 m^3) or more capacity, the mixing time shall be approved. Mixing time shall be measured from the time all

cement and aggregates are in the drum. The batch shall be charged into the mixer so some water will enter in advance of cement and aggregates, and all water shall be in the drum by the end of the first one-fourth of the specified mixing time.

4. For shrink mixed concrete the mixing time in the stationary mixer may be reduced to a minimum of 30 seconds. Mixing shall be completed in a truck mixer by not less than 50, nor more than 100, revolutions of the drum or blades at mixing speed. The batch volume shall not exceed 70 percent of the gross volume of the drum.

5. When a truck mixer is used for complete mixing, each batch of concrete shall be mixed for not less than 70, nor more than 100, revolutions of the drum or blades at mixing speed. Additional revolutions, if any, shall be at agitating speed.

6. When a truck mixer or agitator is used for transporting concrete that has been completely mixed in a stationary mixer, mixing during transport shall be at the agitating speed.

7. Unless otherwise approved, when a truck mixer or agitator is used for transporting concrete:

   a. The concrete shall be delivered to the site of the work and discharge completed within 1.5 hours, or before the drum has revolved 300 revolutions, whichever comes first, after the introduction of the cement to the aggregates.

   b. In hot weather, or under conditions contributing to quick stiffening of the concrete, a time less than 1.5 hours may be directed.

   c. When a truck mixer is used for the complete mixing of the concrete, the mixing operation shall begin within 30 minutes after the cement has been intermingled with the aggregates.

   d. If additional mixing water is added with permission, a minimum of 30 additional revolutions of the truck mixer drum at mixing speed shall be required before discharge of any concrete. When allowed, mixing water may be added one time during the discharge of the concrete.

e. Tests for consistency may be required at approximately the beginning, the midpoint, and the end of the load. If the results vary by more than 1 in. (25 mm) the mixer or agitator shall not be used until the condition is corrected.

8. Central mixed concrete may be transported in suitable non-agitating equipment. Covers shall be provided when required. The bodies of such equipment shall be smooth, mortar-tight metal containers capable of discharging the concrete at a satisfactory controlled rate without segregation. Discharge shall be completed within 45 minutes after the introduction of the cement to the aggregates.

9. Aluminum pipe shall not be used to convey concrete.

10. The Contractor shall furnish concrete that will have a temperature of at least 50^0 F (10^0 C) and not more than 80^0 F (27^0 C) at the time of placing.

E. *Conditioning of Subgrade or Base Course*. The surface of the base or subgrade shall be checked and deficiencies corrected by an approved method ahead of the placing of the concrete.

The surface of the completed base shall be moistened immediately ahead of the placement of concrete pavement. As required, asphalt treated base surfaces shall be moistened immediately ahead of the placement of concrete pavement to ensure compliance with temperature requirements. Excess moisture shall be removed prior to paving.

F. *Temperature Limitations and Cutoff Dates*. Concrete pavement may be placed between May 1 and October 1 with the following precautions: When concreting is authorized during cold weather, the temperature of the mixed concrete shall be not less than 50°F (10°C) and not more than 80°F (27°C) at the time of placing. The Engineer may require the water and/or the aggregate to be heated to not less than 70°F (20°C) nor more than 150°F (65°C). No concrete shall be placed on frozen subgrade nor shall frozen aggregates be used in the concrete.

The temperature of the concrete shall not exceed 80°F (27°C) at time of placement. Unless otherwise approved by the Engineer, the evaporation rate shall not be greater than 0.15 lb./SF (730 g/m²) per hour when tested in accordance with Idaho T-133. It may be necessary to place concrete at night

or in the early morning. Ice may be used as a part of the mixing water provided it has completely melted by the time mixing is completed.

The maximum temperature of the surface to be covered by concrete shall not exceed 90°F (32°C).

Placement of concrete pavement between October 1 and May 1, and when the air temperature is below 40°F (4°C), may be permitted by the Engineer upon written request by the Contractor per Subsection 409.03, Part M, Cold Weather Concreting. Approval of such requests will be based on a work plan that includes the Contractor's methods for protection from freezing and cracking and also addresses monitoring of curing to assure development of required strengths before opening to traffic.

G. *Hand Placing Concrete*. Unless otherwise specified, hand placing and finishing methods will not be permitted except under the following conditions:

1. In the event of breakdown of the mechanical equipment, hand methods may be used to finish the concrete already deposited on the grade when the breakdown occurs.

2. Narrow widths or areas of irregular dimensions where operation of the mechanical equipment is impractical may be placed and finished by hand methods. Forms may be of either wood or metal and must be approved before the concrete is placed.

   When hand placing and finishing methods are permitted, the following requirements will apply:

   a. Upon request of the Engineer, a test section shall be placed to demonstrate that the proposed operation is capable of satisfactorily consolidating and striking off the concrete to the required grade, section, and that applicable smoothness requirements can be met.

   b. Concrete shall be spread evenly. Use of vibrators for extensive shifting of the mass of concrete will not be permitted. Consolidation shall be by surface vibrators, internal vibrators, or other methods that produce equivalent results without segregation. Consolidation shall be done in such a way as to assure adequate consolidation next to

forms and uniformly across the full pavement width. After consolidation, the concrete shall be struck off to the intended surface profile.

c. The screed shall be at least 2 ft. (600 mm) longer than the maximum width of the slab to be struck off. It shall be of approved design, sufficiently rigid to retain its shape, and be constructed either of metal or of other suitable material shod with metal.

d. In operation, the screed shall be moved forward on the forms with a combined longitudinal and transverse shearing motion, moving always in the direction in which the work is progressing, and so manipulated that neither end is raised from the side forms during the striking off process. If necessary, this shall be repeated until the surface is of uniform texture, true to grade and cross section, and free from porous areas.

e. After the concrete has been consolidated and struck off, it shall be smoothed by floating, if necessary. Long handled floats having blades not less than 4 ft. (1.2 m) in length may be used to smooth and fill in open textured areas in the pavement. The use of an approved full width float may be permitted. Movement ahead shall be in successive advances of not more than one-half the length of the float. Floating shall continue until all irregularities are removed. Floating shall follow the consolidation of the concrete by not less than 30 ft. (10 m). Free water on the pavement shall be removed with the float or other suitable tool.

f. When strike off and consolidation are done by the hand method and the crown of the pavement will not permit the use of the longitudinal float, the surface shall be floated transversely by means of the long handled float. Care shall be taken not to work the crown out of the pavement during the operation.

g. After floating, any excess water and laitance shall be removed from the surface of the pavement by a straightedge 10 ft. (3 m) or more in length. Successive drags shall be lapped one-half the length of the blade.

h. All smoothness requirements shall apply.

i. Additional water shall not be placed on the concrete surface during the machine or hand finish operation.

H. *Joints*. Joints shall be constructed in conformance with the details shown on the plans. Suitable guidelines or devices shall be used to assure sawing the joints at the proper location as determined in the field.

1. *Stress Relief Joint Sawing*. The initial stress relief saw cuts shall be made, to control shrinkage cracking, as soon as the concrete has hardened sufficiently to permit sawing without raveling, and shall be sawed to the depth, width, line, and spacing shown on the plans. If necessary, stress relief sawing operations shall continue at night or under inclement weather conditions. If the sawing operation fails to keep pace with the paving operation, paving work shall be stopped until the sawing operation can keep pace with the paving operation.

2. *Sealant Reservoir Construction*. After a minimum of 72 hours curing time, the joints shall be sawed to the width and depth shown on the plans to accommodate sealant placement. Sawing excess width will not be permitted. Immediately after sawing, the Contractor shall thoroughly clean the sides of the sealant reservoir and adjacent pavement surface for a width of approximately 1 in. (25 mm) on each side of the joint, of all scale, dirt, dust, and other foreign material by jet waterblasting. The residue from sawing and waterblasting shall be removed from the pavement surface before it is blown by traffic or wind. The residue shall be prevented from entering lanes used by traffic.

   Any damage to the concrete pavement, such as spalling or fracturing, shall be repaired at the Contractor's expense. All repairs shall be properly cured before installing the joint sealant.

3. *Tie Bars*. Epoxy coated, deformed steel tie bars of the specified length, size, and material shall be placed as shown on the plans. Tie bars shall be placed by approved mechanical equipment or rigidly secured by chairs or other approved supports to prevent displacement. Tie bars shall not be treated so as to impair bonding with the concrete.

Tie bar placement tolerances shall be as shown on the plans or as specified.

4. *Load Transfer Devices.* Load transfer devices shall be incorporated into the concrete pavement by the use of dowel bar assemblies or dowel bar inserters, unless otherwise directed.

   a. *Dowel Bar Assemblies*.

      (1) Fabrication. Dowel bar assemblies, or baskets, shall be fabricated in single units for appropriate lanes prior to being placed on grade. Dowel basket manufacturers shall be approved. Approval shall require submission of material detail sheets providing basket size and complete anchoring details including analysis of basket strength and stability. Approval is required prior to use.

      (2) Anchoring. Dowel bar assemblies shall be securely anchored to the grade to prevent displacement during concrete paving. All baskets shall be secured with at least 8 pins, and the baskets shall hold all bars within tolerance. Dowel basket placement and anchorage will be checked prior to concrete placement. Dowel bar assemblies shall be covered with fresh concrete immediately ahead of the paver. Any dowel baskets removed to accommodate delivery of concrete shall be properly realigned and reanchored prior to arrival of the paver.

      (3) Location. After placement of concrete, dowel bar location shall be checked and documented at a minimum of every 30 joints by the Contractor. The baskets and dowels shall be located with a hand trowel, or other approved method, in plastic concrete, to verify location and accuracy. If bar locations are not acceptable, the joint shall be noted and marked and action shall be taken to determine and correct the deficiencies ahead of the paver.

      (4) Dowel Bars. Dowel bars shall be coated in accordance with AASHTO M 254, Type A or B. Type B dowel bars in assemblies shall be given a thin coating of graphite grease, or equal, as a bond breaker.

On ramps, tapers, and widenings, not more than two assembly sections shall be used in any one joint.

b. *Dowel Bar Inserters*.

As an alternative to dowel bar assemblies on grade, dowel bars may be inserted into the plastic concrete by an approved mechanical device which ensures reconsolidation around the bars. The bars shall be placed parallel to the pavement centerline and surface. The bars shall be inserted before the passage of the final finishing beam or screed.

(1) Approval. Dowel Bar Inserters will not be allowed without prior written approval. The Contractor shall use an approved method for detection and verification of the location of dowel bars when dowel bar inserters are allowed.

(2) Location. At a frequency of not less than 10% of the joints, Ground Penetrating Radar (GPR), pacometer, or other approved device shall be used to establish the location and to ensure compliance with the tolerances of the dowel bar placement. A minimum of two cores shall be taken to verify the calibration of the insertion equipment. This work shall be incidental to the cost of the dowel bars. The joints to be inspected will be determined at random as directed by the Engineer. If the inspection shows dowel bars out of tolerance, the remaining joints will be subject to GPR inspection.

The Contractor shall repair all holes left in the pavement by the coring operation at no additional cost to the State. All repair methods and materials shall be approved by the Engineer prior to beginning repairs.

(3) Dowel Bars. Dowel bars shall be coated in accordance with AASHTO M 254, Type A or B. Type B dowel bars to be inserted shall be given a two layer bond breaker coating. The first layer shall be an approved dry film such as 3M TFE. A thin layer of form oil shall be applied over the dry film. Precautions shall be

taken to prevent form oil runoff from contaminating the fresh concrete.

Tolerances shall be as shown on the plans or as specified regardless of method of incorporation.

All dowel bars, whether placed in baskets or inserted, shall have a minimum of 6 in. (150 mm) embedment in each slab. All missing dowels, or dowels out of tolerance, in the wheel path area, shall be retrofitted. At the option of the Engineer, compensation may be accepted in place of retrofitting bars in areas outside of the wheel path. As compensation, missing dowel bars will be charged to the Contractor at the cost to retrofit the bars into the slabs.

The Contractor shall provide positive control and approved methods of marking dowel locations for correlation to sawed joints.

Where the new concrete pavement abuts the existing concrete pavement, dowels shall be required as shown in the plans. Holes shall be drilled into the existing concrete pavement and dowel bars shall be placed into the holes and epoxy grouted. The epoxy grout shall be approved prior to use.

The drilling of the holes for the dowels will not be paid for separately, but shall be considered incidental to the cost of other concrete pavement items.

5. *Construction Joints*. When ordered, construction joints shall be constructed at right angles to the centerline when there is an interruption of more than 45 minutes in the concrete paving operations.

   The minimum spacing between any two transverse joints shall be 6 ft. (2 m).

   If possible, the Contractor should place the construction joint at the same location as would be used for a transverse joint.

6. *Random Cracks*. After sawing is completed, all random cracks penetrating the full depth of the pavement, whether transverse or longitudinal, shall be

removed by replacement of the cracked slabs. No separate payment will be made for removal and replacement of cracked slabs.

I. *Tolerance in Pavement Thickness.* It is the intent of these specifications that pavement shall be constructed strictly in accordance with the thickness shown on the plans. The thickness of the pavement will be measured, and where any pavement is found deficient in thickness, deductions for or removal of thin pavement will be made. An incentive will be paid for concrete thickness that is in excess of that shown on the plans. The price adjustment will be applied to the item "Concrete Pavement" for each evaluation section in accordance with the table in Subsection 409.05. The table corresponding to the units specified in the plans will be used.

When the surface of the pavement has been finished to final grade, the Engineer will check the thickness of the completed pavement by measuring the distance from the surface of the concrete pavement to the underlying surface by use of a calibrated depth probe. The surface of the pavement shall be satisfactorily restored by the Contractor after thickness measurements have been made. If the Contractor believes that the depth probes taken by the Engineer are not sufficient to indicate the actual area of excess or deficient pavement thickness, the Contractor may take cores as approved by the Engineer. A representative of the Engineer will witness the coring. The Contractor will bear all costs associated with the coring, testing and repairs to the concrete pavement.

The thickness of the pavement will be determined by average depth probe measurements in accordance with Idaho T-130 – Method of Testing Thickness of Plastic Concrete Pavement. The Contractor shall provide access to the paving machine to permit the Engineer to perform the measurements required by Idaho T-130.

For the purpose of determining the pavement thickness and for establishing an adjusted unit price for pavement that either exceeds plan thickness or is deficient in thickness, units to be considered separately are defined as a single placement width 0.1 mi. (0.2 km) long. The concrete thickness determined by the probe will be for the entire area of the test section. The width of the placement will be as defined in Idaho T-130. The average thickness of the pavement will be determined from the probe depths taken as indicated in Idaho T- 130, and shall be calculated as follows:

1. When the thickness, as measured by the probes, is more than specified thickness, but less than 0.5 in. (12.5 mm) greater than the specified thickness, that section shall be calculated for price adjustment according to the table in 409.05.

2. When the thickness, as measured by the probes, is more than 0.5 in. (12.5 mm) greater than the specified thickness, it shall be considered in the calculation of the price adjustment as the specified thickness plus 0.5 in. (12.5 mm).

3. Any areas of pavement which are left in place, but for which no payment is to be made, shall not be taken into account in the calculation of the price adjustment.

4. The average thickness shall be calculated for each section individually.

The thickness incentive will be calculated by comparing the measured average thickness, determined from probes, to the plan thickness for the concrete paving. The difference between these thicknesses will be entered into the Excess or Deficiency in Thickness table. The adjusted payment will be made according to the Excess or Deficiency in Thickness table in Subsection 409.05.

It will be assumed that each depth probe set is representative of the pavement thickness for a distance extending one-half the distance to the adjacent depth probe set, in each direction, measured along centerline, or in the case of a beginning or ending probe, the distance will extend to the end of the pavement section.

J. *Final Finish*. The surface of the concrete pavement shall be finished by the use of a self-propelled steel comb. The stroke shall be either parallel to the transverse joints or perpendicular to the centerline as directed. The tines shall be approximately 4 in. (100 mm) long and spaced as follows: 5/8 in., 1 in., 7/8 in., 5/8 in., 1 1/4 in., 3/4 in., 1 in., 1 in., 1 in., 1 in., 3/4 in., 7/8 in., 1 3/4 in., 7/8 in., 3/8 in., 1 in., 1 in., 1 1/4 in., 1 1/2 in., 7/8 in., 3/4 in., 7/8 in., 1 in., 7/8 in., 1 in. (16 mm, 25 mm, 22 mm, 16 mm, 31 mm, 19 mm, 25 mm, 25 mm, 25 mm, 25 mm, 19 mm, 22 mm, 44 mm, 22 mm, 9 mm, 25 mm, 25 mm, 31 mm, 38 mm, 22 mm, 19 mm, 22 mm, 25 mm, 22 mm, 25 mm). The grooving pattern shall be repeated across the pavement. The grooves shall be formed in the plastic concrete without tearing the surface and without bringing pieces of the coarse

aggregate to the top of the surface. If a double tine comb is used, the tines shall be secured together. If the finishing causes edge slump, the comb will not be used within 1 ft. (300 mm) of either edge and these unfinished edges shall be combed by hand.

Nominal tine widths shall be 1/8 in. (3 mm). Depth of tined grooves shall be 1/8 to 3/16 in. (3 to 5 mm). Measurement of groove depth shall be according to the "Procedure" portion of AASHTO T 261. If more than three (3) readings in a set of ten (10) are outside the intended depth range, make adjustments to the tining operation.

Before the concrete has taken its initial set, the edges of the pavement along each side of each slab, and on each side of transverse expansion joints, formed joints, and construction joints, shall be rounded to a radius of 1/8 in. (3 mm). A well defined and continuous radius shall be produced and a smooth dense mortar finish obtained. The surface of the slab shall not be unduly disturbed by tilting of the tool during use.

Tool marks appearing on the slab adjacent to the joints shall be eliminated. In doing this, the rounding of the corner of the slab shall not be disturbed. Concrete on top of the joint filler shall be completely removed.

Joints shall be tested with a straightedge before the concrete has set, and correction made if one side of the joint is higher than the other, or if they are higher or lower than the adjacent slabs.

Areas of concrete pavement which are not finished in accordance with these requirements shall be corrected by retexturing.

Retexturing shall consist of cutting transverse grooves in the concrete pavement surface by means of saw blades or other approved devices. The grooves shall be spaced 3/4 in. (19 mm) center to center and be 1/8 in. (3 mm) in width and depth. Alternative patterns may be used, subject to approval. The concrete pavement surface, after cutting, shall not be polished.

K. *Surface Test*. The finished pavement shall conform to the following requirements when tested by the Contractor the next working day following placement.

1. The surface shall be straightedged, at locations to be determined by the Engineer, with a 10 ft. (3 m) straightedge. When the straightedge is laid on finished pavement in a direction parallel with centerline or perpendicular to centerline, the surface shall not vary more than 1/4 in. (5 mm) from the lower edge. Any high points that cause the surface to exceed these tolerances shall be removed by grinding.

2. The surface shall be profiled using a California Profilograph in accordance with Idaho T-140 or functional equivalent and these provisions:

   Profiles shall be made 3 ft. (1 m) from and parallel to one edge of each driving lane, and in other locations as directed, with a maximum of two profiles per driving lane.

   Pavement tested shall conform to the following Profile Index requirements:

   a. When longitudinal grade is 4.5 percent or less, pavement on tangent alignment and pavement on horizontal curves having a centerline radius of curve 2000 ft. (600 m) or more shall have a Profile Index of 0.5 in. or less per 0.1 mi. (8 mm or less per 100 m). Consecutive 0.1 mi. (100 m) sections of roadway will be tested with no overlapping.

   b. Pavement on horizontal curves having a centerline radius of curve 1,000 ft. (300 m) or more, but less than 2000 ft. (600 m), and pavement within the superelevation transition of such curves or any pavement with grade greater than 4.5 percent, shall have a Profile Index of 0.7 in. or less per 0.1 mi. (11 mm or less per 100 m).

   The following areas of pavement will not be profiled, unless otherwise specified:.

   a. Pavement on horizontal curves having a centerline radius of curve less than 1000 ft. (300 m) and pavement within the superelevation transition of such curves.

   b. Pavement within 50 ft. (15 m) of a transverse joint that separates the pavement from an existing pavement not constructed under the contract.

c. Pavement for ramps, approaches, structure decks, city streets or county roads.

d. Pavement within 50 ft. (15 m) of a transverse joint that separates the pavement from a structure deck or an approach slab.

Individual high points in excess of 0.3 in. (8 mm), as determined by measurements of the profilogram in accordance with Idaho T-140, shall be reduced by grinding until such high points as indicated by reruns of the profilograph do not exceed 0.3 in. (8 mm).

After grinding has been completed to reduce individual high points in excess of 0.3 in. (8 mm), additional grinding shall be performed as necessary to reduce the Profile Index to values specified above in any 0.1 mi. (100 m) section along any line parallel with the pavement edge.

Additional grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to, the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines perpendicular to the pavement centerline, within any one ground area. All ground areas shall be neat, rectangular areas of uniform surface appearance.

The cost of such grinding and all related expenses such as disposal of ground material, traffic control, flagging, profiling, and temporary striping, shall be borne by the Contractor. The grinding process shall produce a pavement surface that is true to grade and uniform in appearance with longitudinal corrugations that present a narrow ridge, corduroy appearance. The peaks of the ridges shall be approximately 1/16 in. (2 mm) higher than the bottoms of the grooves with approximately 53 to 57 evenly spaced grooves per foot (170 to 190 evenly spaced grooves per meter). Fins resulting from grinding shall be substantially removed prior to opening to traffic.

The grinding equipment shall be a power driven, self-propelled machine that is specifically designed to smooth and texture portland cement concrete pavement, with diamond blades. The effective wheel base of the machine shall not be less than 12 ft. (3.6 m). It shall also be of a shape

and dimension that does not encroach on traffic movement outside the work area. The equipment shall be capable of grinding the surface without causing spalls at cracks, joints, or other locations.

Smoothly feathered transitions shall be made at transverse boundaries between ground and unground areas of concrete.

At longitudinal boundaries between ground and unground areas of concrete, vertical misalignment between ground and unground concrete surfaces shall not exceed 1/8 in. (3 mm). Corrective treatment, if required, shall consist of additional grinding with appropriate cross slope adjustment to feather out the misalignment. No additional payment will be made for such corrective treatment.

The profilograph equipment shall be furnished and operated by the Contractor. It shall be equipped with a recorder capable of producing a graph chart which shall be evaluated by the Contractor in conformance with Idaho T-140, then given to the State for review and retention, no later than the next working day after the chart is produced.

The profilograph shall be operated at the manufacturer's recommended speed. It shall be calibrated at the beginning of the project and as needed thereafter.

The profilograph shall be on the project, calibrated, in good working condition, and ready for operation before construction of any concrete pavement begins. The operator shall be competent and experienced in operation of the equipment.

L. *Curing*. Curing concrete pavement shall be accomplished using a White Pigmented Membrane Forming curing compound.

White Pigmented Membrane Forming Curing Compound. Curing compound shall conform to the requirements of Subsection 709.01 - Membrane Forming Curing Compound, System 2 – AASHTO M 148, Type 2, Class B, White Pigmented Curing Compound.

All concrete cured by this method shall receive two applications of the curing compound for a total coverage of 1 gal / 75 SF (1 L / 2m^2). Each application of

the curing compound shall be applied under pressure at a rate of not less than 1gal / 150 SF (1L / 4m^2) on all textured surfaces of concrete pavement. The second coat of membrane shall be applied in the opposite direction of the first coat.

The entire surface of the pavement shall be sprayed uniformly with the two complete applications of the membrane forming curing compound by an approved machine method after the finishing of the surface and sides and before the initial set of the concrete has taken place.

Membrane forming curing compounds shall be thoroughly mixed before use and agitated during application to prevent settling of the suspended solids. Prior to paving, the Contractor shall demonstrate for approval, the intended method for thoroughly mixing the compound prior to each usage. Hand spraying on odd widths or shapes and on slab edges will be permitted. Curing compound shall not be applied to the inside faces of joints to be sealed. Should the film become damaged from any cause within 72 hours, the damaged portion shall be repaired immediately with additional compound at no additional cost to the State.

If curing compound is applied to construction joints, it shall be removed by sandblasting before fresh concrete is placed.

Each manufacturer's identified lot of curing compound shall be sampled, tested and approved by the Engineer before used. Allow 2 weeks for laboratory testing of the curing compound once it has been received by the Central Materials Laboratory. Quantities of curing compound over 1000 gal. (4000 L) can be inspected and sampled by the State at the manufacturer's plant, for acceptance testing. All such inspection shall be requested by the Contractor to the Engineer and the Central Materials Laboratory Chemistry Section in writing 30 days prior to ordering material.

M. *Cold Weather Concreting*. When concrete pavement is to be placed in cold weather, steps must be taken to reduce the risk of freezing the concrete, developing random cracking in the concrete pavement, or failing to achieve acceptable concrete strength in a reasonable time to support construction equipment and open to the roadway traffic.

When there is a probability of air temperatures below 40°F (4°C) during the placing and curing periods, the Contractor shall submit for approval by the Engineer, prior to concrete placement, a cold weather concreting and curing plan detailing the methods and equipment which will be used to assure that the required concrete temperatures are maintained. The work plan shall include the Contractor's methods to ensure protection from freezing and cracking including equipment, materials and manpower anticipated to execute the work plan. The work plan shall also address continued monitoring of curing to assure development of required strengths before opening to traffic.

Concreting operations shall meet the following requirements when the ambient temperature falls below 40°F (4°C):

1. A supply of suitable blanketing material shall be provided alongside the work during placement of the concrete pavement in quantities sufficient to cover all concrete pavement placed for the specified period of cold weather protection.

2. Anytime the air temperature may be expected to drop to 32°F (0°C) or less during the specified period of cold weather protection, the blanketing material provided shall be spread over all the surface and exposed sides of the concrete pavement to a depth sufficient to prevent freezing of the concrete. Any time the air temperature drops to 35°F (2°C) the concrete shall be covered immediately.

3. The Contractor shall provide at least one calibrated recording thermometer for each 2,500 SY (2000 m^2) of concrete pavement placed. Whenever the air temperature is expected to drop below 40°F (4°C) the Contractor shall place and operate the recording thermometers as approved by the Engineer. Any concrete damaged by frost action shall be removed and replaced at no additional cost to the State.

4. For the purpose of sawing joints, the protection blankets may be removed in a minimum sized area for a time not to exceed ½ hour.

5. The temperature at the surface of the concrete shall be maintained at a minimum of 40°F (4°C) for 7 days. If the Contractor can demonstrate with field cured cylinders that the concrete pavement has reached a compressive strength of at least 2500 psi (17 Mpa) and the concrete is at least 4 days old, no further cold weather protection will be required.

6. When protection blankets are no longer required, they shall be removed during the day so the maximum drop in temperature of the concrete during the first 24 hours shall not exceed 40°F (22°C). The Contractor shall monitor the temperature with a recording thermometer attached to the edge of the concrete pavement, or as approved by the Engineer.

7. Making, storing, and testing of field cure cylinders for the purpose of demonstrating compliance with cold weather protection shall be approved by the Engineer. Testing shall be performed and reports submitted to the Engineer by an approved testing laboratory no later than the next working day after the cylinders are tested. All expenses associated with the field cured cylinders shall be borne by the Contractor.

N. *Sealing Joints*. Joints shall be constructed in accordance with Section 625 - Joints, unless otherwise allowed herein or per manufacturer's recommendations. Joint sealant installation shall be completed after grinding for surface smoothness and before the pavement is opened to traffic. Joint sealing shall be performed only when the ambient and pavement temperatures are 50°F (10°C) or higher, or as allowed per manufacturer's recommendations. The pavement shall be surface dry and sealant shall not be placed unless the weather conditions are dry.

The sealant material shall be as specified or as shown on the plans and shall conform to the requirements of Section 704 - Joint Filler and Sealer. A copy of the manufacturer's recommendations for handling, storage and application of the sealant shall be submitted to the Engineer prior to beginning the work.

1. Neoprene Compression Seal. When Neoprene compression seal is used, the sealant material shall be installed into the joint in accordance with Section 625 - Joints, using equipment and techniques recommended by the manufacturer. The finished joint seal shall have the shape factor and surface recess shown on the plans.

   The longitudinal joint seal shall be installed first and then it shall be cut at the intersections of the transverse joints. The transverse joint seal shall be installed through the cut in the longitudinal seal to form a tight intersection.

The transverse seal shall be installed in one continuous piece. The seal shall not be stretched in excess of the manufacturer's recommendations. The seal shall not be twisted or have any deformity that interferes with the seal making complete contact with the joint face.

2. Silicone Joint Sealant. When silicone joint sealant is used, the backer rod or bond breaker, if required, shall be of the size shown on the plans and of the type recommended by the sealant manufacturer. Not more than one hour prior to placement of the sealant, the joint shall be cleaned by sandblasting and air blowing with 100 psi (700 kPa) minimum compressed air. The compressed air must be free of oil or moisture. The Contractor will not be permitted to place the sealant if dust, moisture, oil, or any foreign material is present on that portion of the concrete which is to receive the sealant. The sealant material shall be applied into the joint using equipment and techniques recommended by the manufacturer. The finished joint seal shall have the shape factor and surface recess shown on the plans.

   Excess joint sealing material on the surface of the pavement shall be removed immediately and the pavement surface cleaned.

   The use of sand or similar material as a cover for the seal will not be permitted.

   Any failure of the joint material in either adhesion or cohesion will be cause for rejection, and the joint shall be repaired to the Engineer's satisfaction at no additional cost to the State.

When silicone joint sealant or Neoprene compression seal is used, a technical representative of the manufacturer shall be present at the job site for at least the first two days during which joint preparation and sealing take place. Recommendations made by the technical representative and approved by the Engineer shall be adhered to by the Contractor. No separate payment will be made for the services of the technical representative nor for carrying out such approved recommendations.

O. *Multiple Lane Construction*. Concrete shall not be placed in adjacent lane(s) sooner than 48 hours after finishing of the first lane(s).

The Engineer may give permission for the operation of equipment and trucks upon newly paved concrete, due to the lack of space elsewhere, if conditions are deemed justified subject to the following conditions:

1. The concrete in the new lane(s) shall have attained a compressive strength of 2500 psi (17 MPa) as determined by field cured test specimens. Making, storing, and testing of field cure cylinders for the purpose of demonstrating that the compressive strength has been achieved, shall be approved by the Engineer. Testing shall be performed and reports submitted to the Engineer by an approved testing laboratory no later than the next working day after the cylinders are tested. All expenses associated with the field cured cylinders shall be borne by the Contractor.

2. The surface of the new pavement shall be protected from scarring and abrasion by operating the equipment on mats, skids or other protective devices satisfactory to the Engineer. Any accumulation of concrete, sand and gravel, or other debris deposited on the new pavement shall be completely removed as directed by the Engineer.

The Contractor shall replace, at no additional cost to the State, any panels on the new pavement that are cracked or broken as a result of operating the equipment thereon.

P. *Protection of Pavement*. Damage to the pavement occurring prior to final acceptance shall be repaired or the pavement replaced at no additional cost to the State.

In order that concrete may be protected against the effects of rain, the Contractor shall have available at all times, materials for the protection of the edges and surface of the unhardened concrete. Such protective materials shall consist of metal or wood having a width of not less than the thickness of the pavement at its edge for the protection of the pavement edges, and covering material such as burlap or cotton mats, curing paper, or plastic sheeting material for the protection of the surface of the pavement. When rain appears imminent, paving operations shall stop and all available personnel shall begin placing forms against the sides of the pavement and covering the surface of the unhardened concrete with the protective covering.

Q. *Opening to Traffic*. The Engineer will decide when the pavement may be opened to traffic. Prior to opening to traffic, the pavement shall be cleaned.The pavement will not be opened to construction or other traffic until field cured test specimens have attained a compressive strength of not less than 3500 psi (24 MPa).

409.04 Method of Measurement. Concrete pavement will be measured by the square yard (square meter) for furnishing and delivery, placing, finishing, curing, tie bars, dowels, joint construction, profiling, grinding to meet smoothness requirements, and all other details of work required.

The square yard (square meter) measurement will be based on the width of the top surface of the pavement shown on the typical section on the plans and additional widening where specified or directed. The length will be measured horizontally along the centerline of each ramp or roadway. Pavement areas will be computed to the nearest 0.1 SY (0.1 m^2). Final measurement of the completed pavement will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

409.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Concrete Pavement	SY (m^2)

THICKNESS PRICE ADJUSTMENT. An incentive will be paid for concrete thickness that is in excess of that shown on the plans. The Contactor shall receive the following price adjustment for each evaluation section exceeding the thickness shown on the plans. If any depth probe measurement of thickness is deficient, the Contractor shall have the option of removing and replacing the pavement at the Contractor's expense or of leaving the pavement in place and receiving the following deductions in payment.

English Table	
Excess or Deficiency in Thickness, in.	**Price Adjustment, Percent of Contract Unit Price**
Over +0.50”	100
+0.35” through +0.50”	102
+0.25” through +0.34”	103
+0.11” through +0.24”	105
+0.10” through -0.10”	100
-0.11" through -0.24"	85
-0.25" through -0.34"	70
-0.35" through -0.50"	50
Over -0.50"	0

Metric Table	
Excess or Deficiency in Thickness, mm.	**Price Adjustment, Percent of Contract Unit Price**
Over +12.5	100
+8.9 through +12.5	102
+6.4 through +8.8	103
+2.6 through +6.3	105
+2.5 through -2.5	100
-2.6 through -6.3	85
-6.4 through -8.8	70
-8.9 through -12.5	50
Over -12.5	0

The above price adjustment will be applied to the entire pavement test section represented by the depth probe measurements. No incentive payments for thickness will be made for any evaluation sections where pavement grinding has occurred to achieve smoothness.

Areas of pavement found deficient in thickness by more than 0.5 in. (12.5 mm) shall be evaluated by the Engineer and if, in the Engineer’s judgment, the deficient area is sufficient to seriously impair the anticipated service life of the pavement, the Contractor shall remove the affected areas of pavement within the limits specified and replace it with concrete of the specified quality and thickness. The Contractor will receive no compensation for the area of pavement removed nor for the materials or labor involved in its removal. Any section of pavement removed shall be the full length between transverse joints.

If, in the opinion of the Engineer, a deficiency in excess of 0.5 in. (12.5 mm) will not seriously impair the anticipated service life of the pavement, the Contractor may elect to leave the pavement in place, but will receive no compensation for the area of pavement determined to be deficient.

When the pavement contains no longitudinal joint, the area of such pavement for which no payment will be made shall be the product of the full width of the strip placed as a unit, multiplied by the distance between probes, on both sides of the deficient measurement, which shows measurements within the thickness limits. When the pavement contains longitudinal joints the width to be used shall be the width between longitudinal joints and the edge of the pavement.

The Engineer reserves the right to order core drilling of the finished pavement, by the Contractor, to determine thickness of the pavement in areas where smoothness corrections are made. Pavement thickness determination by coring will be made after all smoothness correction has been completed.

PROFILE INCENTIVE:

For each evaluation section, where the profile index prior to grinding is less than 0.5 in. per 0.1 mi. (8 mm per 100 m), the Contractor is entitled to an incentive payment. An evaluation section is defined as a 12 ft. (3.6 m) wide placement, 0.1 mi. (100 m) long or fraction thereof as applicable, with profiles in the driving lanes only. The 0.1 mi. (100 m) long sections shall run consecutively from the point paving begins to the point paving is interrupted as shown on the plans such as at bridges and end of lane paving or areas specifically excluded by the specifications. The Profile Index requirements are determined in Section 409.03, Part K - Surface Test. The incentive payment will not be paid for pavement on the roadway shoulders, turn lanes, or other miscellaneous pavement. The incentive will be paid in accordance with the following schedule:

English Schedule	
INITIAL PROFILE INDEX **in. per 0.1 mi. section**	**PAYMENT** **$ per 0.1 mi.**
0.20 or less	$1200.00
0.30 or less	$ 800.00
0.40 or less	$ 240.00
> 0.40 thru 0.50	no payment

Metric Schedule	
INITIAL PROFILE INDEX **mm per 100 m section**	**PAYMENT** **$ per 100 m**
3.5 or less	$750.00
5 or less	$500.00
6.5 or less	$150.00
> 6.5 thru 8	no payment

Only one incentive payment will be made, whichever payment is greatest according to the Initial Profile Index reading above.

Note:

1. When more than one profile run is made in an evaluation section, the roughest profile index will be used to calculate the incentive payment.

2. When the Initial Profile Index exceeds 0.5 in. per 0.1 mi. section or 5 in. in any mile (8 mm per 100 m section or 80 mm in any km) the pavement is subject to rejection.

If grinding is required in accordance with 409.03, Part K-Surface Test, a profile run must be made after grinding to assure minimum specifications have been met.

SECTION 411 - URBAN CONCRETE PAVEMENT

411.01 Description. This work shall consist of the construction of Portland cement concrete pavements on urban highways in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established by the Engineer.

411.02 Materials. Materials requirements shall correspond with those set forth in Subsection 409.02.

Testing shall be in accordance with the applicable test methods listed under Subsection 409.02.

411.03 Construction Requirements.

A. *Proportioning.* Proportioning of materials for concrete shall meet the requirements of Subsection 409.03 with the following exceptions:

Number 3 coarse aggregate shall be used unless otherwise directed.

Maximum slump may be increased to 3 in. (75 mm) when finishing machines that provide only surface vibration are used, and 4 in. (100 mm) when hand methods are used.

In special cases where it is necessary to develop earlier pavement strengths, the Engineer may direct that type III cement be used.

B. *Equipment.*

1. *Mixers and Hauling Equipment.* Mixers, agitators and nonagitating hauling equipment shall meet the requirements of Subsection 409.03.

2. *Strike-Off, Consolidation and Finishing.* The sequence of operations shall be the strike-off and consolidation, floating, removal of laitance, straightedging, and final surface finish. These may be accomplished by (a) hand methods, (b) machine paving with forms, or (c) with a slip form paver.

   Regardless of method, water shall not be added to the surface of the concrete during strike-off, consolidation or finishing operations.

a. *Hand Methods.* Hand methods will be limited to irregular areas, irregular sections, and pavement placed in confined work areas.

Concrete shall be spread evenly. Use of vibrators for extensive shifting of the mass of concrete will not be permitted. Consolidation shall be by surface vibrators, internal vibrators, or other methods that produce equivalent results without segregation. Consolidation shall be done in such a way as to assure adequate consolidation next to forms and uniformly across the full pavement width. After consolidation the concrete shall be struck off to the intended surface profile.

Upon request of the Engineer, a test section shall be placed to demonstrate that the proposed operation is capable of satisfactorily consolidating and striking off the concrete to the required grade and section.

After the concrete has been struck off and consolidated, it shall be smoothed by floating. Movement ahead shall be in successive advances of not more than one-half the length of the float. Floating shall continue until all irregularities are removed. Floating shall follow the consolidation of the concrete by not less than 30 ft. (10 m). Free water on the pavement shall be removed with the float or other suitable tool.

After floating, the surface shall be scraped with a grout rod at least 10 ft. (3 m) in length with a long handle for operating at the edge of the pavement. The grout rod shall be operated to correct irregularities in the pavement surface and remove water and laitance.

Contraction joints shall be placed after all floating has been completed.

b. *Machine Paving with Forms.* The equipment may be any machine or combination of machines which will consolidate the concrete across the full width of the placement into a uniform and homogeneous mass, free of rock pockets, and without separation of mortar and aggregates. Any machinery which the Contractor proposes to use shall be subject to approval by the Engineer. Upon request by the Engineer, a test section of pavement shall be placed for the purpose

of demonstrating the capability of the equipment to satisfactorily strike-off and compact the concrete to the required density, grade, and sections.

Vibrating units may be of the internal, pan, beam or roller type. The vibration equipment shall not be operated when the machine is not in motion and care must be taken not to over vibrate the concrete resulting in an excess of mortar at the surface of the concrete.

Machines shall be operated as many times as necessary to consolidate and finish to the established grade and cross section, and to a smooth even surface so as to require only a very moderate amount of hand finishing.

During machine operations, care must be exercised not to overwork the concrete and bring an excess of fines to the surface. Any water or laitance shall be removed from the surface with a grout rod or scraping straightedge at least 10 ft. (3 m) in length with a long handle and operated from the pavement edge. The finishing operations shall be performed at a time and over such lengths of the pavement surface as existing conditions necessitate.

c. *Slip Form Paving.* Slip form paving equipment shall meet the requirements of.Subsection 409.03.

C. *Handling, Measuring and Batching Materials.* Handling, measuring and batching materials shall meet the requirements of Subsection 409.03.

D. *Mixing and Delivering.* Concrete shall be mixed and delivered in accordance with the requirements of Subsection 409.03.

E. *Forms.* Forms may be of any material provided the forms as constructed result in a pavement of specified thickness, cross section, grade and alignment as shown on the plans.

Forms shall be adequately supported to prevent deflection or movement. The top of the forms shall not deviate more than 1/8 in. (3 mm) in 10 ft. (3 m) and the alignment of forms shall be within 3/16 in. (5 mm) in 10 ft. (3 m). The forms may be removed the day after placement if the concrete is sufficiently set to withstand

removal without danger of chipping or spalling. When forms are removed before the expiration of the curing period, the edges of the concrete shall be sprayed with curing compound. All forms shall be cleaned, oiled, and examined for defects before they are used again.

F. *Weather and Temperature Limitations.* Temperature requirements for mixing and placing urban concrete pavement shall be in accordance with Subsection 409.03.

G. *Placing Concrete.* The forms and surface of the base shall be moistened immediately ahead of the placement of concrete pavement. The concrete shall be placed in a continuous operation between construction joints. The concrete shall be deposited in such a manner as to require as little rehandling as possible. The concrete shall be thoroughly consolidated against and along all forms or adjoining pavement by such means as will prevent gravel pockets along the edges of the finished pavement. Any gravel pockets found after removing the forms shall be repaired.

Reinforcing steel shall be placed around hardware such as manholes and valve covers as shown on the plans or as directed by the Engineer.

The Contractor may be required to place concrete in intermittent areas or to leave temporary gaps in the pavement to allow access to local traffic.

H. *Joints.* Transverse and longitudinal joints for urban pavement may be contraction joints or construction joints as shown on the plans and as called for in these specifications. Where possible, all longitudinal joints shall be placed on lane lines except through transitions and in intersections.

For intersections and other irregular areas, the arrangement of joints shall be placed in accordance with the joint location plan or as directed by the Engineer.

1. *Transverse Contraction Joints.* Transverse contraction joints may be formed or sawed joints.

   a. Formed contraction joints shall be constructed by imbedding a pre-formed joint material. The filler shall be cut to the exact sections of the joint. The length of the pre-molded joint filler shall extend to within 3/16 in. (5 mm) of both edges of any panel.

Transverse contraction joints (dummy joints) shall be placed after consolidation and finishing of concrete have been completed and before initial set. A groove shall be cut into the surface at the location of joint, using a tool provided with stops (tee iron) to prevent cutting the groove deeper than the planned depth of the joint filler. The joint filler shall then be inserted into the groove until the top is flush with the pavement surface, with a deviation of not more than 1/8 in. (3 mm) below the surface. The joint filler shall be at right angles to the surface and always in a straight line.

After the joint filler has been embedded in the concrete, the surface of the pavement shall be finished against the filler strip with hand floats to restore the surface finish. While performing this operation, the filler strip must be maintained in a vertical or normal position, true to alignment. After finishing, the entire area of the joint shall be true to grade and smoothness without any irregularities.

b. Sawed contraction joints shall be constructed in accordance with Subsection 409.03.

2. *Transverse Construction Joints.* Transverse construction joints of the type shown on the plans shall be made at the end of each day's paving, or when placing of concrete is discontinued for more than 30 minutes. If the location of the joint occurs at the location of a contraction joint, the header shall have fastened to the concrete side a wedge-shaped strip of wood to form a key in the concrete. If the joint occurs at any other location, a joint with tie bars shall be used and shall be at least 5 ft. (1.5 m) away from the nearest contraction joint.

3. *Longitudinal Contraction Joints.* Longitudinal contraction joints shall be constructed in true alignment with respect to their proper location on centerline or parallel thereto as shown on the joint location plan. Should multiple lanes be constructed simultaneously, a sawed joint may be used in lieu of the preformed joint material.

   Sawed joints shall be constructed in accordance with Subsection 409.03.

4. *Longitudinal Construction Joints.* Longitudinal construction joints shall be located in accordance with the joint location plan, or as directed. The

Contractor shall submit plans for the keyed joint for approval prior to construction.

I. *Edging.* Before the final finishing is completed and before the concrete has taken the final set, the pavement shall be edged to a 1/8 in. (3 mm) radius. Edging must be done at the proper time. The concrete shall have attained a partial set and all free water shall have disappeared so that the edged joints will be clearly defined, with no tearing or slump of the edges.

J. *Final Surface Finish.* After the slab has been screeded it shall be floated, if necessary, to produce a uniform surface free from porosity. The surface shall then be given a steel tine finish. The tines shall be approximately 4 in. (100 mm) long and spaced at approximately 1/2 to 3/4 in. (12 to 20 mm) intervals. Nominal tine width shall be 1/8 in. (3 mm). Depth of tined grooves is intended to be 1/8 to 3/16 in. (3 to 5 mm). Check groove depth according to the "procedure" portion of AASHTO T261. If more than three (3) readings in a set of ten (10) are outside the intended depth range, make adjustments to the tining operation. Perform the tining in such a way as to minimize surface tearing or aggregate removal. The tine stroke shall be transverse to the roadway centerline and shall be for the full width of the roadway except for strips 1 ft. (300 mm) wide along curb faces, which shall be troweled smooth. Adjacent strokes shall not be overlapped. The finished surface shall be free from porous spots, irregularities, depressions, small pockets, or rough spots.

K. *Surface Test.* As soon as the concrete has hardened sufficiently, the pavement surface will be tested parallel to centerline with a 10 ft. (3 m) straightedge or other approved devices. Areas showing high spots of more than 1/4 in. in 10 ft. (5 mm in 3 m) shall be ground to meet this deviation. This grinding shall be done in accordance with requirements specified in Subsecton 409.03, Part K.

L. *Curing.* Curing shall conform to the requirements of Subsection 409.03.

M. *Multiple Lane Construction.* Concrete shall not be placed in an adjacent lane sooner than 48 hours after finishing of the first lane.

The Engineer may give permission for the operation of equipment and trucks upon newly paved concrete due to the lack of space elsewhere if conditions are deemed justified subject to the following conditions:

1. The concrete in the new lane shall have attained a compressive strength of 2500 psi (17 MPa) as determined by the Engineer.

2. The surface of the new pavement shall be protected from scarring and abrasion by operating the equipment on mats, skids or other protective devices satisfactory to the Engineer. Any accumulation of concrete, sand and gravel, or other debris deposited on the new pavement shall be completely removed as directed by the Engineer.

3. The Contractor shall replace, at his own expense, any panels on the new pavement that are cracked or broken as a result of operating the equipment thereon.

4. A protective ramp shall be constructed at the pavement edge where vehicles may be driven on and off the pavement. The forms shall be left on the outside edge of the first lane at all turnouts until the pavement is opened to traffic.

N. *Protection of Pavement.* The Contractor shall protect the pavement and its appurtenances against both public traffic and traffic caused by his own employees and agents. This shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges or crossovers, etc.

Damage to the pavement occurring prior to final acceptance shall be repaired or the pavement replaced at the Contractor's expense.

In order that the concrete may be protected against the effects of rain, the Contractor shall have available at all times materials for the protection of the edges and surface of the unhardened concrete. Such protective materials shall consist of metal or wood having a width of not less than the thickness of the pavement at its edge for the protection of the pavement edges, and covering material such as burlap or cotton mats, curing paper, or plastic sheeting material for the protection of the surface of the pavement. When rain appears imminent, paving operations shall stop and all available personnel shall begin placing forms against the sides of the pavement and covering the surface of the unhardened concrete with the protective covering.

O. *Opening Pavement to Traffic.* Full use of the pavement by all classes of traffic will not be permitted until test specimens have attained a compressive strength of not less than 3500 psi (24 MPa). Passenger cars and pickup trucks may use the pavement 72 hours after the surface finish is completed. Areas paved with concrete using type III cement may be opened to traffic 24 hours after the surface finish is completed.

If the curbs are cast separately from the pavement, the curbs must be protected for 72 hours by either keeping traffic off the adjacent pavement or by barricades placed along the curb.

411.04 Method of Measurement. Urban concrete pavement will be measured by the square yard (square meter) of concrete pavement completed and accepted. Measurement will be based on the width of the top surface of the pavement shown on the typical cross section of the plans and additional widening where specified or directed. The length will be measured horizontally along the centerline of the roadway.

411.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Urban Concrete Pavement	SY (m^2)

SECTION 412 - PLANT MIX SEAL

412.01 Description. This work shall consist of constructing a plant mix seal in accordance with these specifications and in reasonably close conformity with the details shown on the plans, or as established.

412.02 Materials. Plant mix seal design shall conform to the following requirements:

Type Seal	Minimum Stability	Min. Film Thickness	Min. VMA %	Air Voids %	Min. Immersion Compression %
PMS-OG	N/A	8 microns	15	9-15	50 (per T5040.31)
PMS-MG	30	7 microns	14	5-9	85
PMS-DG	30	6 microns	13	4-5	95

Mix design for PMS-OG shall conform to Technical Advisory T5040.31. Aggregate shall meet the applicable requirements of Section 703 - Aggregates.

The aggregates for PMS-OG, PMS-MG, and PMS-DG plant mix seal shall be provided in two separate stockpiles as follows:

SIEVE SIZE		PMS-1 Pct. PASS	PMS-2 Pct. PASS	PMS-3 Pct. PASS	PMS-4 Pct. PASS
1/2 in.	(12.5 mm)	100			
3/8 in.	(9.5 mm)	95-100	100	100	100
No. 4	(4.75 mm)	0-15	88-100	88-100	95-100
No. 8	(2.36 mm)	0-5	15-30	58-72	75-90
No. 30	(0.60 mm)	0-3	9-18	20-36	35-60
No. 50	(0.30 mm)	0-3	7-14	13-25	20-45
No. 200	(0.075 mm)	0-2	5-10	5-12	5-12

The stockpiles to be used to produce the various PMS classes of plant seal mix are:

PMS — OG: Blend PMS - 1 with PMS - 2
PMS — MG: Blend PMS - 1 with PMS - 3
PMS — DG: Blend PMS - 1 with PMS - 4

The contract shall specify the type of plant mix seal to be used for the project.

The aggregate to be used for plant mix seal shall be screened so that not more than 10 percent of the naturally occurring minus 0.5 in. (12.5 mm) material remains in the material to be crushed. The plus 0.5 in. (12.5 mm) material thus produced shall be crushed to produce the required gradation and tonnage of each stockpile.

For approved Contractor-furnished sources, the target blend percentages and asphalt content will be specified after the source is selected.

The blend of aggregate shall have a sand equivalent of not less than 35 when the combined sample is tested prior to introduction into the dryer.

Ninety percent of the aggregate retained on or above the No. 4 (0.075 mm) sieve in each stockpile shall have a minimum of one fractured face, as determined by AASHTO TP-61, METHOD 1; sixty percent shall have a minimum of two fractured faces. Flat and thin or elongated aggregate particles (length greater than 5 times average thickness) shall not exceed 15 percent by mass in any stockpile.

The stockpile aggregates, when blended together, shall provide a combined mix gradation according to the following table:

MASTER GRADATION RANGE TABLE FOR PLANT MIX SEAL				
PERCENT PASSING BY WEIGHT ON SQUARE MESH SIEVE				
SIEVE SIZE		PMS-OG (OPEN-GRADED)	PMS-MG (MED. GRADED)	PMS-DG (DENSE GRADED)
1/2 in.	(12.5 mm)	100	100	100
3/8 in.	(9.5 mm)	95-100	97-100	97-100
No. 4	(4.75 mm)	30-50	40-65	77-97
No. 8	(2.36 mm)	5-15	20-47	60-83
No.30	(0.60 mm)	.....	8-25	25-50
No. 50	(0.30 mm)	.....	4-18	16-40
No. 200	(0.075 mm)	2-5	2-9	4-11

Aggregate will be accepted at the hot plant. Sampling and testing shall be conducted at the hot plant to assure that a uniform combined aggregate gradation is maintained.

Asphalt shall be of the type and grade called for in the contract. Asphalt furnished shall meet the applicable requirements of Section 702 - Asphalt. Asphalt will be accepted at the point of delivery.

Anti-stripping additive shall meet the requirements of Subsection 702.04. Anti-stripping additive will be accepted at the point of delivery.

Tests shall be made in accordance with the applicable standard methods listed in Subsection 405. 02 - Materials.

412.03 Construction Requirements.

A. Mixing Plant. The requirements of Subsection 405.03 shall apply.

B. Hauling Equipment. The requirements of Subsection 405.03 shall apply.

C. Paver. The requirements of Subsection 405.03 shall apply.

D. Rollers. The requirements of Subsection 405.03 shall apply, except as follows:

Rolling shall be accomplished with a steel wheel roller weighing not more than 12 tons (11 t). Rolling operations shall be conducted in such a manner that shoving, distortion, or stripping will not develop beneath the roller. The amount of rolling shall be confined to only that necessary for consolidating the seal and bonding it to the underlying surface course. Excessive rolling shall be avoided. The use of vibratory compaction method is prohibited.

E. Mix Design Approval. The requirements of Subsection 405.03, Part E shall apply.

F. Mixing. The requirements of Subsection 405.03, Part F shall apply, except as follows:

PMS - OG maximum mix temperature shall be established based on asphalt viscosity. PMS - MG and PMS - DG mix temperature shall not exceed 320°F (160°C). These temperatures shall apply regardless of the type of mixing plant.

The mixtures shall be delivered for use on the roadway at a temperature not lower than 30°F (17°C) below the approved maximum temperature specified above, unless otherwise approved.

G. Spreading and Finishing. The requirements of Subsection 405.03, Part H shall apply, except as follows:

PMS - OG plant mix seal mixture shall be placed directly into the hopper of the paver. Windrowing or other methods of depositing the mixture onto the pavement ahead of the paver will not be permitted unless approved prior to commencement of work.

If windrowing is used to deposit PMS - MG or PMS - DG mixtures onto the pavement ahead of the paver, the following requirements shall apply:

> The maximum allowable length of windrow ahead of the paver shall be restricted such that the temperature of the mixture, measured immediately behind the paver, shall not be less than 225°F (110°C).

Approval to deposit the mixture onto the pavement ahead of the paver will be revoked if there is evidence of segregation of asphalt cement from the mixture or if the work is deemed unsatisfactory in any other respect. Handwork during placement shall be minimized to avoid roughening of the surface.

H. Weather Limitations. Plant mix seal shall be placed in accordance with Subsection 405.03, Part I, except that the air or surface temperature must not be below 60°F (16°C).

I. Joints. The requirements of Subsection 405.03, Part J shall apply, except as follows:

All joints shall be butted rather than lapped.

The vertical edge of the milled wedge shall not exceed the plan depth of the plant mix seal.

J. Compaction. The plant mix shall be compacted with a minimum of 2 passes of a roller as quickly as possible after placement, to obtain compaction and to bond the seal to the existing surface. Rolling shall follow the paver as closely as possible. Reduction in number of passes shall be as directed by the Engineer.

Compaction shall be completed before the mix temperature drops below 175°F (80°C).

An additional roller pass may be required below 175°F (80°C) to remove roller marks.

Unless otherwise directed, rolling shall begin at the sides and proceed longitudinally parallel to the road centerline, each pass overlapping one-half the roller width. When paving in echelon or abutting a previously placed lane, the longitudinal joint should be rolled first followed by the regular procedure. On superelevated curves, the rolling shall begin at the low side and progress to the high side by overlapping of longitudinal passes parallel to the centerline.

Care shall be exercised in rolling not to displace the line and grade of the edges of the pavement.

Along forms, curbs, headers, walls and other places not accessible to the rollers, the mixture shall be thoroughly compacted with mechanical tampers or other approved compactors. All of the mixture shall be removed from the gutter surface prior to rolling.

An acceptance test strip shall not be required

K. Condition of Existing Surface. Surface preparation and application of tack coat shall be in accordance with Section 401 - Tack Coat.

L. Miscellaneous Pavement. The requirements of Subsection 405. 03 shall apply.

412.04 Method of Measurement. Plant mix seal and asphalt will be measured by the ton (metric ton). Batch weights will not be permitted as a method of measurement. The plant mix seal quantity shall be the weight used in the accepted pavement and shall include the weight of the aggregate, asphalt, and any additives in the mixture.

Anti-stripping additive will be measured by the percentage of additive per ton (metric ton) of asphalt.

Miscellaneous pavement will be measured by the square yard (square meter). Final measurement will be based on plan quantities unless these quantities are significantly altered by authorized changes. Such payment is to be in addition to the cost of asphalt and plant mix material.

412.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Plant Mix Seal Type_____	Ton (t)
Asphalt Cement for Plant Mix Seal	Ton (t)
% Anti-stripping Additive for _____ Plant Mix Seal	TOA (MTOA)
Plant Mix Seal Type _____ (including asphalt and additives)	Ton (t)
Miscellaneous Pavement	SY (m^2)

Asphalt for tack coat and brooming will be paid for under their respective items.

No separate payment will be made for asphalt and additives for such bid items as "Plant mix Seal Type_____ (including asphalt and additives)." The percentage of asphalt in the mix shall be in accordance with the approved mix design (Job Mix Formula). An adjustment in the total amount paid for the bid item shall be made after the pavement is complete. The adjustment will be based on the invoice price of asphalt and additives used and the percent of asphalt and additives shown on the plans under "Estimating Basis". The adjustment shall cover only the increase or decrease from the specified value. Said adjustments shall not apply to contractor furnished sources.

SECTION 500 - STRUCTURES

SECTION 501 - STRUCTURES

501.01 Description. This work shall consist of the construction of structures, in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or established.

501.02 Materials. If directed, foundation tests shall be conducted in accordance with AASHTO T 235.

These tests shall be performed by the contractor under the supervision of the Engineer to determine the elevation at which the bottom of the abutment or piers will be placed.

501.03 Construction Requirements.

A. *General.* No concrete shall be placed until the depth of the excavation and the foundation material have been approved.

B. *Cofferdams and cribs.* Cofferdams shall be constructed to protect fresh concrete against damage from a sudden rising of the stream and to prevent damage by erosion. No timber or bracing shall be placed inside of cofferdams or cribs that cannot be removed without damage to the concrete. The cofferdam or crib material used shall be of sufficient length to allow a 2 ft. (600 mm) lowering of footings.

Pumping from the interior of any foundation enclosure shall be done in such manner as to prevent any portion of the concrete materials from being carried away. No pumping will be permitted during the placing of concrete or for a period of at least 24 hours thereafter, unless it is done from a suitable sump or well point separated from the concrete work.

The Contractor shall remove all cofferdams, cribs, sheeting and bracing down to the elevation of the original ground line or to the new stream bed elevation in case of a channel change or to the top of footings in dry holes. The removal shall be done in such a manner as not to damage any part of the new structure.

C. *Foundation Seal.* When required by the plans or ordered, a concrete foundation seal shall be constructed.

The foundation enclosure shall then be pumped out and the balance of the masonry placed in the dry. Pumping to dewater a sealed cofferdam shall not commence until the seal has set sufficiently to withstand the hydrostatic pressure.

When weighted cribs are employed and the weight utilized to partially overcome the hydrostatic pressure acting against the bottom of the foundation seal, special anchorage such as dowels or keys shall be provided to transfer the entire weight of the crib into the foundation seal.

D. *Drainage of Substructure.* The material behind abutments, retaining walls and wing walls shall be thoroughly and effectively drained by means of granular backfill.

E. *Bearing and Anchorage.* Bearing plates shall be set level in exact position and shall have a full and even bearing upon the masonry. The location of the anchor bolts in relation to the slotted holes in the expansion shoes shall correspond with the temperature at the time of erection. The nuts on the anchor bolts at the expansion end of the spans shall be set to permit the free movement of the span. Rocker bearings at the expansion end of spans shall be set to the proper position for the prevailing temperature.

F. *Placing Concrete.* Unless otherwise specified, the concrete in slab spans, T-beams, or deck girders shall be placed in one continuous operation.

If continuous placement of concrete girders or decks of a multispan continuous structure is specifically permitted by the plans, or is approved, a set retarding admixture for the concrete may be required. Proportions are to be varied with temperature and degree of initial retardation required to extend the plastic characteristics of the concrete. If continuous concrete placement is attempted, the concrete in any one span shall be placed while the concrete in the adjacent span is still plastic. The Contractor shall submit a placing schedule for approval showing the proposed amount of admixture to be used in placing deck concrete. Materials for use as chemical set retarding admixtures shall meet the

requirements of AASHTO M 194, Type B or Type D; however, no reduction in concrete 28-day strength will be allowed.

G. *Construction Joints.* Construction joints shall be made only where located on the plans, or shown in the placement schedule, unless otherwise approved.

If not detailed on the plans, or in the case of emergency, construction joints shall be placed as directed. Shear keys shall be used where necessary to transmit shear. All reinforcement shall extend beyond the construction joint at least the splice length of the reinforcing bar as shown on the plans.

Before depositing new concrete on or against concrete which has hardened, the forms shall be re-tightened.

When shear keys are not provided, the concrete shall be roughened to a depth of at least 1/4 in. (6 mm). The surface of the hardened concrete shall be roughened as required, in a manner that will not leave loosened particles of aggregates or damaged concrete at the surface.

All construction joints shall be thoroughly cleaned of foreign matter and laitance, and saturated with water before fresh concrete is placed against the joint. The placing of concrete shall be carried continuously from joint to joint. The face edges of all joints that are exposed to view shall be carefully finished true to line and elevation.

501.04 Method of Measurement. Not Specified.

501.05 Basis of Payment. Not Specified.

SECTION 502 - CONCRETE

502.01 Description. Portland cement concrete shall be proportioned and mixed in accordance with these specifications and placed in reasonably close conformity with the lines and grades shown on the plans or established. The Contractor shall submit a proposed mix design to the Engineer for review. The Engineer will review the mix design for compliance with specifications prior to approving use of the proposed mix design.

Separate bids may be taken on Schedule No. 1 Concrete placed in the substructure and Schedule No. 2 Concrete placed in the superstructure. The schedule and class will be shown on the structures involved with corresponding items in the bid schedule.

A. *Classification.* The following classes of concrete shall be used where required in the plans:

TABLE A
BASIC MIX DESIGN PARAMETERS
English Units

Concrete Class in (100 psi) (28 Day)[(a)]	Minimum Cement Content Lb./CY[(b)]	Max. Water Cement Ratio	Slump In.	Air Content Percent
45 and greater **(c)(d)(e)**	660	.44	4 Max.	0-6
35 to less than 45 **(c)(d)(e)**	560	.44	4 Max.	0-6
30	560	.49	5 Max.	6.5±1.5
22	470	.60	8 Max.	0-6
15	380	.60	8 Max.	0-6
Seal Concrete	660	.60	8 Max.	0-6

SI Units

Concrete Class in Mpa (28 Day)[(a)]	Minimum Cement Content kg/m^3 [(b)]	Max. Water Cement Ratio	Slump mm	Air Content Percent
31.0 and greater **(c)(d)(e)**	392	.44	100 Max.	0-6
24.0 to less than 31.0 **(c)(d)(e)**	330	.44	100 Max.	0-6
20.5	330	.49	125 Max.	6.5±1.5
15.0	280	.60	200 Max.	0-6
10.5	230	.60	200 Max.	0-6
Seal Concrete	390	.60	200 Max.	0-6

(a) Numerical part of class designation is the specified compressive strength when tested in accordance with applicable test listed in Subsection 502.02 - Materials.

(b) It may not always be possible to produce concrete of the specified compressive strength using the minimum cement content. No separate payment will be made for additional cement required to meet the specified compressive strength.

(c) Concrete classes designated as “A” will have a slump of 1.5 in. to 3.5 in. (40 mm to 90 mm) and air content of 6.5±1.5 percent.

(d) Concrete classes designated as “B” will have a slump of 5 in. (125 mm) max. and air content of 6.5±1.5 percent.

(e) Concrete classes designated as “C” will have a maximum water cement ratio of 0.40, (water reducer required), a slump of 1.5 in. to 3.5 in. (40 mm to 90mm) and air content of 6.5±1.5 percent.

TABLE B
BASIC MIX DESIGN PARAMETERS
WHEN FLY ASH CONCRETE IS REQUIRED
English Units

Concrete Class in 100 psi (28 Day)[a]	Minimum Cement Content Lb/CY [b]	Minimum Fly Ash Content Lb/CY [b][f][g]	Max. Water To Cement (Plus Fly Ash) Ratio	Slump in.	Air Content Percent
45F and greater **(c)(d)(e)**	550	138	.42	4 Max.	0-6
35F to less than 45F **(c)(d)(e)**	467	116	.42	4 Max.	0-6
30 F	467	116	.47	5 Max.	6.5±1.5
22 F	392	98	.58	8 Max.	0-6
15 F	317	79	.58	8 Max.	0-6
Seal Concrete W/Fly Ash	550	138	.58	8 Max.	0-6

SI Units

Concrete Class in Mpa (28 Day)[a]	Minimum Cement Content kg/m³ [b]	Minimum Fly Ash Content kg/m³ [b][f][g]	Max. Water To Cement (Plus Fly Ash) Ratio	Slump mm	Air Content Percent
31.0 F and greater **(c)(d)(e)**	326	82	.42	100 Max.	0-6
24.0 F to less than 31.0 F **(c)(d)(e)**	277	69	.42	100 Max.	0-6
20.5 F	277	69	.47	125 Max.	6.5±1.5
15.0 F	233	58	.58	200 Max.	0-6
10.5 F	188	47	.58	200 Max.	0-6
Seal Concrete W/Fly Ash	326	82	.58	200 Max.	0-6

(a) Numerical part of class designation is the specified compressive strength when tested in accordance with applicable test listed in Subsection 502.02 - Materials.

(b) It may not always be possible to produce concrete of the specified compressive strength using the minimum cement and fly ash contents. If additional cement and fly ash are needed to meet strength requirements, they shall be added at the ratio of 1 lb. (0.45 kg) fly ash per 4 lb. (1.8 kg) cement. No separate payment will be made for additional cement and fly ash required to meet the specified compressive strength.

(c) Concrete classes designated as "AF" will have a slump of 1.5 in to 3.5 in. (40 mm to 90mm) and air content of 6.5±1.5 percent.

(d) Concrete classes designated as "BF" will have a slump of 5 in. (125 mm) max. and air content of 6.5±1.5 percent.

(e) Concrete classes designated as "CF" will have a maximum water cement ratio of 0.38 (water reducer required), a slump of 1.5 in. to 3.5 in. (40 mm to 90mm) and air content of 6.5±1.5 percent.

(f) Class F fly ash shall be used.

(g) It may not always be possible to produce concrete using the minimum fly ash content that will ensure mortar bar expansion does not exceed 0.10 percent expansion when tested in accordance with AASHTO T 303. If additional fly ash is needed to meet the mortar bar expansion requirements, it may be added without a corresponding increase in cement provided the strength requirements are met. Lithium or other mitigating measures may be required, as approved by the Engineer, in order to comply with this requirement.

(h) Fly ash shall not exceed 25 percent of the total cementicious material (fly ash + cement).

Unless otherwise provided, concrete shall be Class 30 (Class 20.5) and the coarse aggregate used in any class of concrete shall be size Nos. 2 or 3 except for Class 40A (27.5A) concrete and prestressed girders in which size No. 2 coarse aggregate shall be used. The slump shall not vary more than 1 in. (25 mm) from the average during any one placement. Should an increase in slump be desirable for the concrete as batched, the ratio of the weight of water to cement shall be maintained by either making proportional increases of cement with increases in water or by reducing the total weight of aggregates incorporated in the mixture.

B. *Acceptance*. Acceptance of concrete is based on conformance with all parameters specified for the given concrete class. Acceptance of strength will be determined from the results of 28-day compressive strength tests performed

in conformance with Subsection 502.02 - Materials, on cylinders made from samples of the concrete being placed. Average strength from three companion cylinders will be considered as one test.

1. Conventionally Reinforced Concrete. Should the 28- day strength for any test for conventionally reinforced concrete fall below the specified minimum strength, the concrete of that class represented by the test shall be subject to rejection or price adjustment if allowed to remain. Concrete subject to rejection or price adjustment shall be that represented by the test that falls below the specified strength.

   Conventionally reinforced concrete which fails to meet the specified strength for the class required may be accepted at a reduced price provided the strength is not more than 10 percent below the specified strength. Concrete of this type represented by tests falling more than 10 percent below specified strength, is subject to rejection.

2. Precast, Prestressed and Cast-In-Place Post-Tensioned Concrete. Precast, prestressed and cast-in-place post-tensioned concrete shall meet the release strength and 28- day strength as shown on the plans. Concrete which fails to meet these strengths, may be cause for rejection of the member in which it is placed.

Unacceptable concrete shall be replaced at no additional cost to the State.

The price adjustment for concrete which fails to meet the intended strength, but is allowed to remain in place, as determined by the Engineer, shall be in accordance with the following table:

Percent of Specified Strength	**Pay Factor**
100 and above	1.00
between 95 and below 100	0.90
above 90 and below 95	0.80
below 90	Subject to rejection.*

*If allowed to remain in place, as determined by the Engineer, the Pay Factor will be 0.50.

The quantity of acceptable concrete will be paid for at the contract unit price multiplied by the pay factor as determined above.

Concrete subject to price adjustment or rejection, may be core drilled as an alternative test for acceptance. Cost of obtaining and testing such core samples shall be borne by the Contractor. The location and number of the cores shall be determined by the Engineer. Coring and testing will be witnessed by the Engineer. If the Engineer determines that taking multiple cores will be detrimental to the integrity and quality of the work, then the number of cores shall be limited to one set of three. The Contractor shall repair all holes left by the coring operation at no additional cost to the State. All repair methods and materials shall be approved by the Engineer prior to beginning repairs.

If the Contractor obtains cores following notification of failing strength in sufficient time for such cores to be tested prior to the lapse of a 42- day time limit from the time of placement, the 28-day strength of the concrete placed and represented by the drilled core samples shall be determined as the average of the test results of the drilled cores. If, however, the Contractor delays in obtaining core samples for strength determination, they shall be acceptable to the Engineer for testing only when the Contractor submits a correlation curve developed by an approved independent testing laboratory to relate strength at the actual test age to 28-day strength for the particular class and design mix represented by the cores. When the Contractor elects to supply drilled cores and submits acceptable drilled cores, as described above, to the Engineer for testing, both the Contractor and State shall accept the results of the tests of the drilled cores in lieu of the results on the test cylinders.

Such cores shall be obtained and tested in accordance with AASHTO T 24 except that the cores shall be protected from moisture gain or loss and shall be tested as soon as possible without further conditioning other than preparation of the ends, if such preparation is needed. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. If, before testing, one or more of the cores shows evidence of having been damaged subsequent to or during removal, it shall be replaced with a new core. Tests made on cores taken form the work may include, but is not limited to, compressive strength, cement content by ASTM C 1084, and petrographic analysis by ASTM C856 (including water cement ratio and air content.)

If the average strength of the cores from conventionally reinforced concrete is less than the specified strength for the area represented, the concrete shall be removed or accepted at a reduced price, as specified above.

If the average core strength of the pre-cast, pre-stressed, or post-tensioned member is less than the required strength, the member may be rejected and replaced with a new member at no cost to the state. In some cases, if the Engineer determines that it is appropriate, the Engineer may perform additional engineering analysis to determine if the concrete may be allowed to remain in place and accepted at a reduced price.

Should concrete used in the work fail to conform to the specified compressive strength, the Contractor shall, at his expense, make corrective changes in the materials mix portions, concrete fabrication procedures, or other corrective action before continuing. If results of 7-day strength tests are low or indicate a downward trend predicting concrete may not meet the specified 28-day strength, corrective changes will be made. Changes will be subject to written approval of the Engineer.

Concrete with specified strength of 3000 psi (20.5 Mpa) or less (including seal concrete) from qualified aggregate material suppliers may be accepted by certification. Concrete mix designs including strength test data are required for acceptance by certification. A Contractor using this classification of concrete on a project shall provide test results from at least one load for every 40 CY (30 m^3) of concrete used indicating slump, unit weight, air content, and compressive strength to verify the certification. A Contractor using this classification of concrete to produce concrete products for an ITD project (pre-cast products) shall provide test results for every 40 CY (30 m^3) of concrete used indicating slump, unit weight, air content, and compressive strength to verify the certification.

502.02 Materials. Materials shall meet the requirements specified in the following Subsections of Section 700 Materials:

Portland Cement 701
Aggregate 703
Membrane Forming Curing Compounds 709.01
Air Entraining Admixtures 709.03
Set Retarding Admixtures 709.04
Water Reducing Admixtures 709.05
Water 711.01
Fly Ash 714

Admixtures shall be approved before use.

An aggregate correction factor for the concrete aggregate shall be determined for each mix design. The aggregate correction factor shall be determined in accordance with AASHTO T 152.

Testing shall be done in accordance with the following standard methods:

Compressive Strength of Cylindrical Concrete Specimens .....AASHTO T 22

Making and Curing Concrete Test Specimens in the Field .....AASHTO T 23
(Except cylinders shall be molded only in 6 in dia. x 12 in
(300 mm x 600 mm, single use molds made of plastic.)

Obtaining and Testing Drilled Cores
and Sawed Beams of Concrete .....AASHTO T 24
(Provisions of AASHTO T 24 relating to ASTM and ACI
references do not apply unless otherwise specified.)

Slump of Hydraulic Cement Concrete .....AASHTO T 119

Mass Per Cubic Meter (Cubic Foot), Yield, and
Air Content (Gravimetric) of Concrete .....AASHTO T 121
(including cement content.)

Making and Curing Concrete Test Specimens in the Laboratory .....AASHTO T 126
(Except cylinders shall be molded only in 6 in dia. x 12 in
(300 mm x 600 mm) single use molds made of plastic.)

Measuring Length of Drilled Concrete Cores .....AASHTO T 148

Air Content of Freshly Mixed Concrete by the Pressure Method .....AASHTO T 152

Measuring Texture Depth of Portland Cement Concrete
Using a Tire Tread Depth Gage .....AASHTO T 261
(modified)
(Provisions of AASHTO T 261 relating to calculations, reporting, and
subdividing into sublots do not apply unless otherwise specified)

Pavement Straightedge Procedures .....Idaho T-87

Determination of the Rate of Evaporation of
Subsurface Moisture From Concrete .....Idaho T-133

Determining the Percentage of Fracture of Coarse Aggregate .....AASHTO TP-61 (Method 1)
Sampling Freshly Mixed Concrete .....WAQTC TM-2

Accelerated Detection of Potentially Deleterious
Expansion of Mortar Bars Due to Alkali-Silica Reaction.....AASHTO T 303

Temperature of Freshly Mixed Portland Cement Concrete .....AASHTO T 309

502.03 Construction Requirements.

A. *Proportioning.* Concrete mix design is the Contractor's responsibility, and shall include making and testing compressive strength specimens, which may be done in the Contractor's laboratory or by an approved independent laboratory. Each mix design submitted by the Contractor shall be uniquely identified. The proportion of the ingredients for each mix design shall be submitted for review by the Engineer. For proportioning each batch see Subsection 502.03, Part C-Handling, Measuring and Batching Materials. The proposed mix design shall be tested in accordance with applicable listed test procedures and AASHTO T 126.

Basic mix strength shall equal or exceed the design mix strength calculated for the specified class of concrete. Classes 15 (10.5) and 22 (15.0) are exempt from this requirement.

Basic mix strength shall be determined by either of two methods:

1. Average of at least 15 consecutive field production tests using the proposed mix design, provided that the tests cover a period not less than 45 days and occurred during the last 12 months.

2. Average strength of three test cylinders from a laboratory prepared trial mix based on the proposed mix design and prepared during the last 12 months.

In addition to strength, the air content and slump shall be reported for each test. Strength data obtained by either method are valid only if all air content and slump tests are within required limits for the specified mix class.

Design mix strength shall be determined by either of two methods:

1. (Method 1) Product of the specified strength (class) of concrete multiplied by the appropriate factor obtained from the following table. Coefficient of variation shall be calculated from at least 15 consecutive field production tests using the proposed mix design, or a similar mix design, provided that the tests cover a period not less than 45 days and occurred during the last 12 months. The mathematical definition of coefficient of variation appears in the ACI Manual of Concrete Practice, Section 214. Interpolation is permitted.

Similar Mix, percent	**5**	**10**	**15**
Factor for all concrete except cast-in-place girders	1.07	1.15	1.24
Factor for cast-in-place girders	1.09	1.20	1.33

NOTES: Coefficient of variation is a statistical measure of the variation in strength among specimens from a given plant. If coefficient of variation is above 15 percent, plant operations will be reviewed and an appropriate factor will be developed.

If fewer than 30 test results are available, the calculated coefficient of variation shall be multiplied by the following factor before using the table above. Interpolation is permitted.

No. of Tests	**30 or More**	**25**	**20**	**15**	**Less than 15**
Factor for Modified C.V.	1.00	1.03	1.08	1.16	Use Method 2

2. (Method 2) Sum of the specified strength (class) of concrete plus the value obtained from the following table.

Laboratory specimens, produced in accordance with AASHTO T 303, shall be required using the cement, fly ash, and other mitigative additives proposed for use in

Concrete Class	Location	Design Mix Strength
Specified Strength 3000 psi thru 5000 psi (20 MPa thru 35 Mpa)	All concrete Except cast-in-place girders	Specified Strength + 1200 psi (8 MPa)
	Cast-in-place girders	Specified strength + 1600 psi (11 MPa)
Specified Strength Over 5000 psi (35 MPa)	All concrete Except cast-in-place girders	Specified Strength + 1400 psi (10 MPa)
	Cast-in-place girders	Specified Strength + 2000 psi (14 MPa)

the mix design. Expansion of mortar bars shall not exceed 0.10 percent with the addition of fly ash, lithium, or other additives.

When fly ash concrete is required by the contract, the mix design shall conform to 502.01, Part A, Classification, Table B – Fly Ash Concrete.

When the contract does not require fly ash, the Contractor may elect to use it subject to the same requirements as when the contract requires fly ash.

Whenever fly ash is used, the same fly ash source (power plant), cement source (mill), and cement type shall be used throughout the project in any individual mix design unless a change is approved by the Engineer. Approval for a change may only be given upon submission of lab test reports by the Contractor to verify that the revised mix design meets all specification requirements.

High range water reducers (superplacticizers) meeting ASTM C 494 may be used, subject to the following additional requirements. Water/(cementitious materials) ratio shall not exceed 0.35, excluding water contained in the admixtures. Cementitious materials are the sum of cement, fly ash, silica fume, ground slag, and any other pozzolans. The sum of cement, pozzolan (if any), and the aggregate passing the #16 (18 mm) sieve, shall be at least 1355 lb. per cubic yard (805 kg per cubic meter) of concrete. Slump limits are as follows,

except that any time segregation is evident, placement shall stop and corrective action taken.

English Table			Metric Table	
Total of cement, pozzolan, and aggregate passing the No. 16 sieve, lb./CY	Max. slump after addition of superplacticizer, in.		Total of cement, pozzolan, and aggregate passing the 1.18 mm sieve, kg./ m^3	Max. slump after addition of superplacticizer, mm
1355 to 1415	6 ½		805 to 840	165½
1416 to 1474	7 ½		841 to 874	190
1475 or more	8 ½		875 or more	215

Superplacticizer redosing to maintain slump may be completed up to two times. Slump, concrete temperatures, and air content must remain within the specification limits after redosing. A minimum amount of additional drum revolutions beyond the limit will be allowed in a redosing situation.

When concrete is pumped to the point of placement, adjustments to basic mix proportions may be required to assure concrete meets specifications at the placement end of the line. Such adjustments shall be the Contractor's responsibility, and no separate payment will be made. The Engineer shall be notified in writing prior to implementing such adjustments. Changes other than admixture dosage adjustments will require laboratory verification as a new mix design.

B. *Equipment*.

1. *Mixers and Agitators*. Mixers may be stationary mixers or truck mixers. Agitators may be truck mixers or truck agitators. Truck mixers and agitators shall be equipped with means by which the number of revolutions of the drum, blades, or paddles may be readily verified. Each mixer and agitator shall have attached thereto, by the manufacturer, a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the volume of the drum, the capacity of the drum or container in terms of the volume of mixed concrete, and the speed of rotation of the mixing drum or blades. Plates shall be in accordance with NRMCA standards. Stationary mixers shall be equipped with an acceptable timing device that will not permit discharge until the specified mixing time has

elapsed. Truck mixers shall be equipped with a calibrated water flow meter or other approved measuring device to control the amount of mixing water added in the field.

2. The mixers, when loaded to the rated mixing capacity and the concrete mixed for the time or revolutions prescribed, shall combine the ingredients of the concrete into a thoroughly mixed and uniform mass and discharge the concrete with satisfactory uniformity, as specified in Subsection 502.03, Part D, *Mixing and Delivery.*

3. The agitators, when loaded to rated capacity, shall maintain the mixed concrete in a thoroughly mixed and uniform mass and discharge the concrete with a satisfactory degree of uniformity as indicated in Subsection 502. 03, Part D, *Mixing and Delivery*.

C. *Handling, Measuring and Batching Materials*. The production of concrete, meeting the approved mix design, is the responsibility of the Contractor.

The proportion of the ingredients for each batch shall be submitted to the Engineer at the time of batching.

Changes to the mix design must be requested and approved, but minor adjustments due to varying moisture in the aggregates and minor adjustments of approved admixtures are not considered changes in the mix design and will not require approval of a new mix design. Minor adjustments shall be reported to the Engineer prior to batching.

1. Cement shall be measured by weight or by number of sacks. When measured by weight, cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until released for discharge. The cement hopper shall be attached to a separate scale for individual weighing or shall be attached to the aggregate scale for cumulative weighing. If cement is weighed cumulatively, it shall be weighed before the other ingredients. The scale and weigh hopper for cement shall be separate and distinct from aggregate weighing equipment. Cement batchers shall be provided with a dust seal between the charging mechanism and hopper, installed in such a way as not to affect the weighing accuracy and vented to permit the escape of air. The hopper shall be self cleaning and fitted with means to assure complete discharge.

Sufficient wind protection shall be provided to prevent interference with batching accuracy. When cement is measured in sacks, no fraction of a sack shall be used unless weighed. The cement, as weighed, shall be within one (1) percent of the design weight.

2. Aggregates shall be measured by weight. The individual aggregates, as weighed, shall be within two (2) percent of the required weights and the total weight of the aggregate shall be within two (2) percent of the required weight. Aggregates shall be handled from stockpiles or other sources to the batching plant in such a manner as to maintain a uniform grading and stable moisture content of the material. All aggregates produced or handled by hydraulic methods and washed aggregates shall be stockpiled or binned for draining at least 12 hours before being batched.

3. Water shall be measured by volume or by weight. The measuring device shall be so arranged that the measurements will not be affected by variable pressures in the water supply line. Wash water shall not be used as a portion of the mixing water. Water, as weighed or measured, shall be within one (1) percent of the required amount.

4. Fly Ash shall be measured by weight. The fly ash, as weighed, shall be within one (1) percent of the design weight.

5. Dry admixtures shall be measured by weight, and paste or liquid admixtures by weight or volume. Admixtures used in small quantities in proportion to the cement, as air entraining admixtures, shall be dispensed with the mixing water. Any adjustments to the amount of admixtures used shall be in accordance with manufacturer's recommendations. The quantities of admixtures used shall be within three (3) percent of the required amount. If more than one admixture is used, they shall conform to the requirements of Subsection 709.02, Concrete Admixtures - General.

6. If batches must be transported to the mixer, cement and aggregates shall be transported from the batching plant to the mixer in batch boxes, vehicle bodies, or other containers of adequate capacity and construction to properly carry the volume required.

D. *Mixing and Delivery.*

1. Concrete shall be mixed and delivered by means of any of the following:

   a. Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in agitating equipment or in nonagitating equipment when approved. (Known as central mixed concrete.)

   b. Mixed completely in a truck mixer at the batching plant or while in transit. (Known as transit mixed concrete.)

   c. Mixed completely in a truck mixer at the point of delivery following the addition of mixing water. (Known as truck mixed concrete.)

   d. Mixed partially in a stationary mixer, and the mixing completed in a truck mixer. (Known as shrink mixed concrete.)

   e. Mixed in an approved mixer, which volumetrically measures the concrete ingredients and continuously produces concrete, which meets the requirements of ASTM C 685.

2. Truck mixers and truck agitators shall be operated within the rated capacity and at a speed of rotation for mixing or agitating as designated by the manufacturer of the equipment.

3. When a stationary mixer is used for the complete mixing of the concrete, the mixing time for mixers having a capacity of 10 CY (8 m^3) or less, shall be 50 seconds minimum. For 10 CY (8 m^3) or more capacity, the mixing time shall be approved. Mixing time shall be measured from the time all cement and aggregates are in the drum. The batch shall be so charged into the mixer that some water will enter in advance of cement and aggregates, and all water shall be in the drum by the end of the first one- fourth of the specified mixing time.

4. For shrink mixed concrete the mixing time in the stationary mixer may be reduced to a minimum of 30 seconds. Mixing shall be completed in a truck mixer by not less than 50, nor more than 100, revolutions of the drum or blades at mixing speed. The batch volume shall not exceed 70 percent of the gross volume of the drum.

5. When a truck mixer is used for complete mixing, each batch of concrete shall be mixed for not less than 70, nor more than 100, revolutions of the drum or blades at mixing speed. Additional mixing, if any, shall be at agitating speed.

6. When a truck mixer or agitator is used for transporting concrete that has been completely mixed in a stationary mixer, mixing during transport shall be at the agitating speed.

7. Unless otherwise approved, when a truck mixer or agitator is used for transporting concrete:

   a. The concrete shall be delivered to the site of the work and discharge completed within 1.5 hours, or before the drum has revolved 300 revolutions, whichever comes first, after the introduction of the cement to the aggregates.

   b. In hot weather, or under conditions contributing to quick stiffening of the concrete, a time less than 1.5 hours may be directed.

   c. When a truck mixer is used for the complete mixing of the concrete, the mixing operation shall begin within 30 minutes after the cement has been intermingled with the aggregates.

   d. If additional mixing water is added with permission, a minimum of 30 additional revolutions of the truck mixer drum at mixing speed shall be required before discharge of any concrete. When allowed, mixing water may be added one time during the discharge of the concrete.

   e. Tests for consistency may be required at approximately the beginning, the midpoint, and the end of the load. If the results vary by more than the tolerance specified below, the mixer or agitator shall not be used until the condition is corrected.

When Average Slump Is		Tolerance
4 in. (100 mm) or Less		1 in. (25 mm)
More than 4 in. (100 mm)		1.5 in. (40 mm)

8. Central mixed concrete may be transported in suitable nonagitating equipment. Covers shall be provided when required. The bodies of such equipment shall be smooth, mortar-tight metal containers capable of discharging the concrete at a satisfactory controlled rate without segregation. Discharge shall be completed within 45 minutes after the introduction of the cement to the aggregates.

9. Aluminum pipe shall not be used to convey concrete.

10. The Contractor shall furnish concrete that will have a temperature of at least 50^0 F (10^0 C) and not more than 80^0 F (27^0 C) at the time of placing.

E. *Falsework and Forms*.

1. *General*. The Contractor shall submit working drawings, loading assumptions, allowable material stresses used in design, and final design calculations for proposed falsework and formwork. Working drawings and approval are not required for footings or walls unless either is more than 4 ft. (1.2 m) high. The wall height will be measured from the top of footing. The working drawings and design calculations shall be stamped by an Engineer registered in the State of Idaho.

   The Contractor shall submit plan sheets to the Railroad for review and approval showing all railroad falsework clearances. When falsework crosses or is adjacent to traffic, it shall be designed to include a positive barrier between the construction and traffic to prevent the possibility of dropping construction items into the roadway.

   Approval of the falsework or formwork working drawings, or any inspection performed by the Engineer, will in no way relieve the Contractor of full responsibility for the falsework and forms.

   The construction of any unit of falsework or formwork shall not start until the drawings for that unit are reviewed and approved.

   The Contractor shall, for design purposes, field verify to his satisfaction all ground elevations shown on the plans at the proposed falsework footing locations.

2. *Plans*. The Contractor shall submit four sets of falsework or formwork drawings and design calculations. Working drawings shall identify materials used, including grades of lumber, in sufficient detail to permit accurate checking.

   The Contractor may revise the working drawings provided at least four weeks are allowed for review before construction is started on the revised portions.

   The working drawings shall include a placing diagram showing the concrete placing sequence, rate of pour, and construction joint locations. When a schedule for placing concrete is shown on the contract plans, no deviation will be permitted, unless approved.

   The Contractor shall submit, with the working drawings, manufacturer's catalog data listing the weight of all construction equipment that will be supported by the falsework.

   When footing type foundations are to be used, the Contractor shall determine the bearing value of the soil and shall show the values assumed in the design of the falsework on the falsework drawings. Assumed values for both wet and dry soil conditions shall be shown.

   Anticipated total settlements and/or deflections of falsework and forms shall be shown on the working drawings and shall include falsework footing settlement, joint take up and deflection of beam or girders. Anticipated settlements and/or deflection of falsework shall not exceed 1 in. (25 mm). Falsework and forms supporting deck slab and overhangs on girder bridges shall be designed so that there will be no differential settlement between the girders and the deck forms during placement of deck concrete.

3. *Design*

   a. *General*. For the design of falsework and formwork, all provisions of the AASHTO Guide Design Specifications for Bridge Temporary Works are incorporated by reference in these Specifications with the following exceptions:

(1) Where they conflict with the contract specifications, the contract specifications shall govern.

(2) Where other Codes and Standards are referenced in the Guide the most current edition of that Code or Standard shall be used, unless otherwise directed by the Engineer.

(3) The falsework and formwork design calculations shall show the stresses and deflections of all load supporting members.

(4) Camber strips shall be designed, furnished, and installed by the Contractor as directed to compensate for beam deflection, vertical alignment, and anticipated structure deflection.

b. *Permanent Metal Concrete* Forms. Permanent metal forms for decks shall not be used unless required or specifically permitted by the plans. Materials shall meet the requirements of Subsection 708.31.

The design of permanent metal forms shall be in accordance with the following criteria and the loads as specified in Part 3, Design, of this subsection.

(1) The unit working stress in the steel sheet shall be not more than 0.725 of the specified minimum yield strength of the material furnished, but not to exceed 36000 psi (250 MPa).

(2) The maximum deflection under the weight of the forms, plastic concrete, and reinforcement, or a load of 120 psf (5750 Pa), whichever is greater, shall not exceed 1/180 of the form span or ½ in. (13 mm), whichever is less.

(3) The form span for computation of stress and deflection shall be not less than the clear span of the corrugated form material plus 2 in. (50 mm).

(4) Physical design properties shall be computed in accordance with requirements of AISI *Specifications for the Design of Cold formed Steel Structural Members*, latest published edition.

(5) All reinforcement shall have a minimum concrete cover of 1 in. (25 mm). Bars in the bottom layer of the main reinforcement shall be approximately centered over the valleys of the forms when necessary to achieve the minimum 1 in. (25 mm) concrete cover.

(6) Positive lateral support shall be provided by the use of concrete haunches formed against the top flanges of steel beams or girders except where shear connectors are provided.

(7) Longitudinal deck construction joints shall not be located between stringers where permanent metal forms are used.

(8) Support angle legs extending into the deck concrete in excess of ½ in. (13 mm) shall be cut off.

Forms shall be installed in accordance with detailed fabrication plans submitted for approval. The fabrication plans shall meet the requirements of Subsection 502.03, Part E, *Falsework and Forms*, Part 2, and shall include the grade of steel used and the calculations for the moment of inertia of the form.

Form sheets shall not rest directly on the tops of the stringer or floor beam flanges. Sheets shall be securely fastened to form supports and shall have a minimum bearing length of 1 in. (25 mm) at each end. Form supports shall be placed in direct contact with the flange of stringer or floor beam. Attachments shall be made by bolts, clips, or other approved means. The method of attachment shall be submitted to the Engineer for approval with the fabrication plan.

Damaged galvanized coating on exposed form metal shall be thoroughly cleaned, wire brushed, and then painted with two coats of zinc oxide zinc dust primer, Federal Specification TT-P-64Id, Type II.

Transverse construction joints shall be located at the bottom of a flute and ¼ in. (6 mm) weep holes shall be field drilled at not less than 12 in. (300 mm) on center along the line of the joint.

Should the Engineer determine that the procedures used during the placement of concrete warrant inspection of the underside of the deck, the Contractor shall remove at least one section of the forms at a location and time selected for each concrete placement on each span in the contract. This shall be done as soon after placing the concrete as practicable in order to provide visual evidence that the concrete mix and the Contractor's procedures are obtaining the desired results. An additional section shall be removed each time the concrete mix or the Contractor's procedures are changed, if so directed.

After the deck concrete has been in place for a minimum period of 2 days, the concrete shall be tested for soundness and bonding of the forms by sounding with a hammer as directed. If areas of doubtful soundness are disclosed by this procedure, the Contractor will be required to remove the forms from such areas for visual inspection after the concrete has attained adequate strength, at no additional cost to the State.

At locations where sections of the forms are removed, the Contractor will not be required to replace the forms, but the adjacent metal forms and supports shall be repaired to present a neat appearance and assure their satisfactory retention. All unsatisfactory concrete shall be removed or repaired as directed.

4. *Construction.*

a. *General.* The Contractor shall provide tell-tales attached to the soffit forms and readable from the ground in enough systematically placed locations to determine the total settlement of the entire portion of the structure where concrete is being placed.

Should unanticipated events occur, including settlements that deviate more than ±3/8 in. (± 10mm) from those indicated on the falsework drawings, the placing of concrete shall be discontinued until corrective measures are provided. When directed to suspend placing of concrete the Contractor shall construct a temporary bulkhead at a

location determined by the Engineer. All unacceptable concrete shall be removed at no additional cost to the State.

b. *Bracing.* Temporary bracing shall be provided, as necessary, to withstand all imposed loads during erection, construction and removal of any falsework whose height exceeds its clear distance to either the edge of any sidewalk or shoulder of any roadway which is open to the public. The falsework drawing shall show provisions for such temporary bracing or methods to be used to conform to this requirement during each phase of erection and removal. Wind loads shall be included in the design of such bracing methods. The falsework shall be set to give the finished structure the camber specified or indicated on the plans. In addition to the camber shown, allowance shall be made for settlement of the falsework using 1/8 in. (3 mm) for each contact of timbers.

c. *Expansion Joints*. At the ends of bridge deck expansion joints, joint material (or the armor angles of compression seals) shall be securely fastened to the overhang forms in order to prevent relative movement during concrete placement. On deck rehabilitation work, shimming and/or tack welding new steel joint elements to existing armor angles, or parts thereof, may be required.

d. *Bridge Rail, Curbs, and Parapets*. The concrete portions of bridge rails, curbs, and parapets shall be cast-in-place utilizing conventional fixed formwork unless otherwise noted on the plans.

e. *Form Fasteners*. Form fasteners consisting of form bolts, clamps, or other devices shall be used as necessary to prevent spreading of the forms during concrete placement. The use of ties consisting of twisted wire loops to hold forms in position will not be permitted.

f. *Anchor Devices*. Anchor devices may be cast into the concrete for later use in supporting forms or for lifting precast members. The use of driven types of anchorages for fastening forms or form supports to concrete will not be permitted. Form fasteners and anchors shall be of such types that they can be removed without chipping, spalling, heating, or otherwise damaging the concrete surface.

Except as provided herein, all form bolts, metal ties or anchors, or any other metal placed for the convenience of the Contractor shall be removed to a depth of at least 1 in. (25 mm) below the surface of the concrete. The resulting holes or depressions shall be cleaned and filled with mortar. Form bolts projecting into the cells of box girders shall be removed flush with the surface of the concrete.

g. *Mortar*. Mortar shall be furnished and placed in recesses and holes, on surfaces, under structural members, and at other locations specified in these specifications, the Special Provisions, or as shown on the plans.

The mortar shall be composed of Portland cement, sand, and water. The proportion of cement to sand, measured by volume, shall be 1 to 2 unless otherwise specified. Materials shall conform to the requirements of Subsection 701.01 - Portland Cement. The maximum size of sand shall not be larger than one half the size of the recess, hole, or space where the mortar is to be placed. The mortar shall contain only enough water to permit placing and packing.

Concrete areas to be in contact with the mortar shall be cleaned of all loose or foreign material that would in any way prevent bond between the mortar and the concrete surfaces and shall be flushed with water and allowed to dry to a surface dry condition immediately prior to placing the mortar.

The mortar shall completely fill and shall be tightly packed into recesses and holes, on surfaces, under structural members, and at other locations specified. After placing, all surfaces of mortar shall be cured by the water method as provided in Subsection 502.03, Part J - Curing Concrete, for a period of not less than 3 days.

Keyways, spaces between structural members, holes, spaces under structural members, and other locations where mortar could escape shall be mortar tight before placing mortar.

No load shall be allowed on mortar that has been in place less than 72 hours, unless otherwise approved by the Engineer.

All improperly cured or otherwise defective mortar shall be removed and replaced by the Contractor at no expense to the State.

For exposed surfaces, white cement shall be added to the mortar in an amount sufficient to result in a patch which, when dry, matches the surrounding concrete.

h. *Forms*. The inside surfaces of forms shall be cleaned of all dirt, mortar, and foreign material. Forms, which will later be removed, shall be thoroughly coated with form oil prior to use. The form oil shall be a commercial quality form oil or other equivalent coating, which will permit the ready release of the forms and will not discolor the concrete.

Concrete forms shall be mortar tight; true to the dimensions, lines, and grades of the structure; and of sufficient strength to prevent appreciable deflection during the placing of the concrete.

Concrete shall not be deposited in the forms until all work connected with constructing the forms has been completed, all materials required to be embedded in the concrete have been placed for the unit to be poured, and the Engineer has inspected said forms and materials. Such work shall include the removal of all dirt, chips, sawdust, water, and other foreign material from the forms.

The rate of depositing concrete in forms shall be controlled to prevent deflections of the forms or form panels in excess of the deflections permitted by these specifications. Forms for all concrete surfaces which will not be completely enclosed or hidden below the permanent ground surface shall conform to the requirements herein for forms for exposed surfaces. Interior surfaces of underground drainage structures shall be considered to be completely enclosed surfaces.

All exposed surfaces of each element of a concrete structure shall be formed with the same forming material or with materials which produce similar concrete surface textures, color, and appearance.

Forms for exposed surfaces shall be faced with form panels. A form panel shall be considered to be the continuous section of form facing

material, unbroken by joint marks, against which the concrete is placed.

Form panels for exposed surfaces shall be furnished and placed in uniform widths of not less than 3 ft. (1 m) and in uniform lengths of not less than 6 ft. (2 m), except where the width of the member formed is less than 3 ft. (1 m), the width of the panels shall not be less than the width of the member. Panels shall be arranged in symmetrical patterns conforming to the general lines of the structure. Except when otherwise provided herein or shown on the plans, panels for vertical surfaces shall be placed with the long dimension horizontal and with horizontal joints level and continuous. For walls with sloping footings which do not abut other walls, panels may be placed with the long with sloping footings which do not abut other walls, panels may be placed with the long dimension parallel to the footing. Form panels on each side of the panel joint shall be precisely aligned, by means of supports or fasteners common to both panels, to result in a continuous, unbroken concrete plane surface.

Forms for exposed surfaces shall be constructed with triangular fillets not less than ¾ in. x ¾ in. (20 mm x 20 mm) attached so as to prevent mortar runs and to produce smooth, straight chamfers at all sharp edges of the concrete.

5. *Removal of Falsework and Forms*.

Forms and falsework shall not be removed without the approval of the Engineer. This approval shall not relieve the Contractor of responsibility for the safety of the work. Blocks and bracing shall be removed at the time the forms are removed and in no case shall any portion of the wood forms be left in the concrete. Falsework removal procedures for continuous or cantilevered structures shall be included with the working drawings. If the contractor intends to remove falsework and forms before 28 days, his submitted mix design for that concrete shall be proportioned and designed to provide the minimum strengths required, in accordance with this specification, at the proposed removal time. The falsework and forms shall not be removed before the minimum number of days for the applicable structural element. Further, the contractor is directed to Subsection 502.03, Part F.

Test cylinders to determine compressive strengths for form removal and loading shall be cast by the Contractor, witnessed by the Engineer, and tested at the Contractor's expense at an approved independent laboratory. Test cylinders shall be field cured adjacent to the member represented, equivalent to the most unfavorable field conditions.

Compressive strength values used to determine compressive strength for form removal and loading shall be the average from two companion cylinders.

Loading of a member shall be defined as any additional horizontal or vertical load being applied other than loads from formwork and reinforcing steel of further concrete placements.

For post-tensioned concrete bridges the falsework supports which might continue to remain engaged after structure units are pre-stressed, shall be released in such a manner as to permit the concrete to accept its own weight and distribution of stresses uniformly and gradually. Sequence of disengagements shall be such that fixed connections at tops of piers will not be subjected to damaging forces.

Sequence of falsework support disengagement shall be shown on falsework drawings. In any case, the stressing operation in pre-stressed units must be completed and approved before supporting falsework may be removed.

If any forms are removed before seven (7) days have elapsed, the Contractor shall apply either a membrane forming curing compound or a water cure in accordance with Subsection 502.03, Part J, to all exposed surfaces, except for construction joints. Construction joints shall be cured using a water cure as specified in Subsection 502.03.

The forms for footings constructed within cofferdams or cribs may be left in place when their removal would endanger the safety of the cofferdam or crib, and when the forms so left will not be exposed to view in the finished structure. All other forms shall be removed whether above or below the ground line or water level. All forms shall be removed from the cells of box girders.

Remove all forms and falsework in a manner to permit the concrete to uniformly and gradually take the stresses due to its own mass.

The Contractor may remove forms and falsework or place subsequent loads when both conditions of the following table for the activity involved are met:

TABLE FOR FORM AND FALSEWORK REMOVAL AND LOADING OF CONCRETE		
PART 1: Removal of Forms and Falsework:		
Structural Element	**Min. Days [1,2]**	**Strength of Concrete Based on Percent of Design Strength[5]**
a. Side forms for footings, Abutment caps, pier caps, traffic and pedestrian barriers, and any other side forms not supporting the concrete mass. (except as noted in Part 1(b) of this table)	1	---------
b. Columns, abutment backwalls, and retaining walls (For elements 5 feet (1.5m) or more in height)	3	50
Cantilever bridge deck sidewalks	7	---------
Bridge decks, top slabs of concrete box culverts or stifflegs	10	80
c. Crossbeams, caps, box girders, T-beam Girders, and flat slab superstructures[3]	7	80
d. Signal, Luminaire, and Sign Support Foundations (If applicable)	7	80
PART 2: Subsequent Loading[4] of:		
Structural Element	**Min. Days[1]**	**Strength of Concrete Based on Percent of Design Strength[5]**
a. Footings and abutments	3	80
b. Bottom slabs of box girders (with falsework in place)	5	80
c. Columns and walls	5	100
d. Bridge decks, top slabs of concrete box culverts or stifflegs and all other members	10	100
e. Signal, Luminaire, and Sign Support Foundations (If applicable)	7	100

[1] From the time of the last placement in the forms or falsework supports and excluding the days when the surrounding temperature is below 40°F (4°C) for a total of four hours or more. All requirements of Subsection 502.03, Part G - Cold Weather Concreting, shall still apply. The Contractor shall monitor the temperature during curing time through the use of continuous recording thermometers.

[2] Forms shall not be removed until the concrete has sufficient strength to prevent damage to the surface or cause over stressing of the concrete.

[3] Where continuous spans are involved, the time for all spans will be determined by the last concrete placed affecting any span.

[4] Except loads from formwork and reinforcing steel of further concrete placements.

[5] Standard concrete mix designs will typically not achieve strength in the minimum days shown.

F. *Placing Concrete*.

1. *General*. Concrete shall not be placed until forms and metal reinforcement have been inspected. The forms shall be clean of all debris before concrete is placed. Concrete shall be placed so as to avoid segregation of the materials and displacement of the reinforcement. When placing operations would involve dropping the concrete more than 5 ft. (1.5 m), it shall be deposited through sheet metal or other approved tubes. As far as practicable, the tubes shall be kept full of concrete during placing and their lower ends shall be kept buried in the newly placed concrete.

   The Contractor shall place concrete in the forms as soon as possible after mixing. The concrete shall always be plastic and workable. Concrete placement shall be continuous, with no interruption longer than 30 minutes between adjoining layers, unless a longer time is authorized by the Engineer. Care shall be taken to fill each part of the form by depositing the concrete as near the final position as possible. Each layer shall be placed and consolidated before the preceding layer takes initial set. After initial set of the concrete, the forms shall not be jarred and no strain shall be placed on the ends of projecting reinforcement.

   Unless otherwise approved by the Engineer, bridge decks and other concrete flatwork shall not be placed when the evaporation rate is greater than 0.15 psf (730 g/m²) per hour when tested in accordance with Idaho T-133. In some cases, it may be necessary to place such concrete at night or early in the morning. Flatwork is defined as any surface which is not cured in contact with a form and which is not part of a construction joint. Surfaces which are essentially vertical are excluded from the definition.

The Contractor shall use the proper mix design and combination of low shrink materials, low temperature concrete, proper curing techniques, or other procedures necessary to eliminate or minimize the development of cracks.

The surface crack intensity of concrete bridge decks is indicated by the number and size of cracks in the top surface of the concrete. The Contractor shall remove all equipment and material from the deck and clean the surface as necessary for the Engineer to measure the crack intensity. Surface crack intensity will be determined after completion of concrete cure and prior to pre-stressing or release of any forms or falsework. In any 60 SY (50 m^2) portion of deck, should the intensity of cracking be such that there are more than 50 ft. (15 m) of cracks whose width at any location exceeds 0.02 in. (0.500 mm), all cracks in that portion shall be filled with a two component modified methacrylate penetrating sealer or equal as approved by the Engineer. All costs associated with filling the cracks according to the penetrating sealer manufacturer's product recommendations shall be at the Ccontractor's expense. Decks that have excessive cracking or cracking that jeopardizes the structural integrity of the deck, as determined by the Engineer, may be deemed unacceptable and shall be removed at the Contractor's expense.

2. *Vibrating*. Unless otherwise approved, the concrete shall be consolidated with suitable vibrators operating within the concrete. Vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate consolidation, especially around obstructions.

   Vibrators shall transmit vibrations to the concrete at frequencies of not less than 5,000 impulses per minute. Vibrators used in concrete containing epoxy coated reinforcement shall have a resilient covering to prevent damage to the epoxy coating.

   Deck concrete shall be vibrated with internal vibrators turning at least 10,800 rpm in air and shall be fully submerged. Spacing of the vibrator in the concrete mix shall be approximately 18 to 24 in (450 to 600 mm) measured in longitudinal and transverse directions.

   Vibrators shall be so manipulated as to work the concrete thoroughly around the reinforcement and imbedded fixtures and into corners and angles of the forms.

Vibrators shall not be used as a means to cause the concrete to flow or run into position in lieu of placing. The vibration at any point shall be of sufficient duration to accomplish thorough consolidation, but shall not be prolonged to the point where segregation occurs. Vibrators will not be required for seal concrete or concrete in shell piles.

3. *Underwater Concrete*. Concrete deposited in water shall be seal concrete. No concrete other than that used for seals may be placed in or under water unless otherwise permitted in writing by the Engineer.

   To prevent segregation, concrete shall be carefully placed in a compact mass, in its final position, by means of a tremie, a bottom dump bucket, or other approved method, and shall not be disturbed after being deposited.

   Concrete shall not be placed in running water. The forms for underwater concrete shall be constructed to provide still water within. The concrete shall be placed continuously until the required depth is reached, keeping the surface of the concrete as nearly level as possible during placing.

   If a tremie is used, the placing shall comply with the following requirements:

   A tremie shall consist of a watertight tube having a diameter of not less than 10 in. (250 mm) with a hopper at the top. The tube shall be equipped with a device that will prevent water from entering the tube while charging the tube with concrete. The tremie shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and to permit rapid lowering, when necessary to retard or stop the flow of concrete. The tremie shall be filled by a method that will prevent washing of the concrete. The discharge end shall be completely submerged in concrete at all times and the tremie tube shall contain sufficient concrete to prevent water entry. When concrete is dumped into the hopper, the flow of concrete shall be induced by slightly raising the discharge end, always keeping it in the deposited concrete.

4. *Massive Placement*. Footings thicker than 4 ft. (1.2 m) will be considered as massive placements. Special measures shall be taken to minimize the possibility of drying shrinkage cracks developing in massive footings during placing and curing of the concrete.

The maximum temperature difference shall be 35°F (19°C) between all points across the top surface of a footing, during placing and throughout the full 7 day curing period of the concrete. The Contractor shall propose, for approval, construction methods that will achieve this uniformity of temperature, and if any methods prove inadequate, the Contractor shall adopt different and/or additional measures as necessary to achieve the uniformity.

G. *Cold Weather Concreting*.

1. Heating and Placing Concrete. When there is a probability of air temperatures below 40°F (4°C) during the placing and curing periods, the Contractor shall submit for approval by the Engineer prior to concrete placement, a cold weather concreting and curing plan detailing the methods and equipment which will be used to assure that the required concrete temperatures are maintained. Concreting operations shall meet the following requirements when the ambient temperature falls below 40°F (4°C).

   Before any concrete is placed, all ice, snow and frost shall be completely removed. The Contractor shall furnish concrete that will have a temperature of at least 50°F (10°C) and not more than 80°F (27°C) at the time of placing. Concrete shall not be placed against any material whose temperature is 32°F (0°C) or less.

   When necessary, in order to produce concrete of the specified temperature, either the mix water or the aggregates, or both, shall be heated prior to batching. Heating shall be done in a manner which is not detrimental to the mix and does not prevent the entrainment of the required amount of air. The methods used shall heat the materials uniformly. Aggregates shall not be heated directly by gas or oil flame or on sheet metal over fire. Neither aggregates nor water shall be heated to over 150°F (66°C). If either are heated to over 100°F (38°C), then they shall be mixed together prior to the addition of the cement so that the cement does not come into contact with materials which are in excess of 100°F (38°C).

2. Protection of Concrete. The temperature of the concrete shall be maintained at a minimum of 50°F (10°C) for 7 days or 70°F (21°C) for 3

days after placement except when steam curing is used. When fly ash is used, the time shall be increased to 10 days for 50°F (10°C) and 5 days for 70°F (21°C). Where uniform surfaces of concrete such as decks are involved, the temperature at the surface shall be maintained at the temperatures and times as determined above. Where water cure is required for concrete as specified in Subsection 502.02, Part J, at no time shall the water be allowed to freeze during the curing period.

Concrete may be protected and cured under water provided that the temperature of the water does not fall below 35°F (2°C) and at least 6 in. (150 mm) of water is maintained over the concrete for a minimum of 10 days.

Combustion heaters shall be blocked up off the surface of the concrete and vented to the outside of the enclosure.

The maximum temperature within the enclosure shall not exceed 120°F (49°C) when the concrete is protected by any means other than steam.

For protection methods other than the use of steam, the maximum drop in temperature of the concrete throughout the first 24 hours after the end of protection shall be 50°F or 28°C.

When steam is used in the protection of the concrete, the method shall conform to the requirements of this Subsection, Curing Concrete.

The Contractor shall furnish calibrated recording thermometers with the range of 0 to 212°F (-18 to 100°C).

Temperatures shall be recorded on a chart continuously for not less than 24 hours. A sufficient number of recording thermometers shall be furnished as required to keep adequate records of temperatures.

On small quantities of concrete used in minor structures, sign foundations, and nonstress placement such as sidewalks and curb and gutter, the Contractor shall protect the concrete from freeze damage by covering the concrete with suitable blanketing material. The Contractor shall maintain such protective covering for a minimum of 5 days. Recording thermometers shall be used to show that concrete used in minor structures was not exposed to freezing temperatures.

H. *Hot Weather Concreting*. The temperature of concrete shall not exceed 80°F (27°C) at time of placement. When the combination of ambient air temperature, concrete temperature, humidity and wind is such that rapid evaporation of moisture from the concrete surface will take place, the Contractor shall take measures to slow evaporation to tolerable limits. Such measures may include, but are not limited to, erecting sunshades or placing at night or early morning. Ice may be used as a part of the mixing water providing it has completely melted by the time mixing is completed.

The temperature of the surface to be covered by concrete shall not exceed 90°F (32°C).

I. *Finishing Concrete*. Concrete surfaces shall be finished as follows:

1. Ordinary Surface Finish
2. Rubbed Surface Finish
3. Slab Finish

All formed surfaces shall be given an Ordinary Surface Finish, and in addition, if further finishing is required, such other type of finish as is specified. If not otherwise specified in the contract documents, exposed surfaces, except the soffits of superstructures and the interior faces and bottoms of concrete girders, shall also be given a Rubbed Surface Finish.

1. *Ordinary Surface Finish*. Immediately after the forms have been removed, the Contractor shall remove form bolts and tie wires. If rock pockets are of such extent or character as to materially affect the strength of the structure or to endanger the life of the steel reinforcement, the Engineer may declare the concrete defective and require the removal and replacement of that portion of the structure affected. All holes and depressions shall be cleaned, thoroughly wetted, and filled with a cement mortar composed of one part of cement to two parts of sand. An approved bonding agent may be required. All fins caused by form joints and other projections shall be removed above the ground line. The resulting surfaces shall be reasonably smooth and uniform in texture and color. All surfaces which are not finished satisfactorily shall be “rubbed,” as specified for Rubbed Surface Finish.

2. *Rubbed Surface Finish*. After the pointing has set sufficiently, the entire surface shall be thoroughly wetted and rubbed with a carborundum stone

or other approved method. An approved bonding agent may be required. The paste formed by the rubbing shall be spread uniformly over the surface after which it shall be finished by floating or rubbing to attain a uniform color and texture.

Concrete which has been discolored by the drip from the abrasive shall be thoroughly cleaned by using a dilute solution of muriatic acid, then washing thoroughly with clean water.

When metal forms, fiber forms, lined forms, or plywood forms in good condition are used, the requirement for a Rubbed Surface Finish may be waived by the Engineer when the uniformity of color and texture obtained with Ordinary Surface Finish are essentially the equal of a Rubbed Surface Finish. In such cases, grinding with powered disc grinders or light sandblasting with fine sand, or other means approved by the Engineer, may be utilized in conjunction with Ordinary Surface Finish.

3. *Slab Finish*. Deck slabs and wearing surfaces shall be finished and straightedged as set forth below:

Deck slabs greater than 40 ft. (12 m) in length and other wearing surfaces subject to highway traffic which are greater than 40 ft. (12 m) in length shall be finished by the machine method. All other deck slabs and wearing surfaces may be finished using either machine or hand methods.

Additional water shall not be placed on the concrete surface during machine or hand finishing operations.

After finishing by either the machine or hand method, the concrete surface shall be straightedged, given a broom finish, and meet the completed surface requirements as set forth in paragraphs c, d and e below.

a. Machine Method. A self-propelled finishing machine will be required for striking off and finishing the surface of the concrete. The Contractor shall furnish the information as to the location and method of rail support, the size of rails, and a detailed description of the finishing machine.

Prior to beginning concreting operations, the finishing machine shall be operated over the full length of the bridge segment to be finished. This test run shall be made with the screed adjusted to its finishing position. While operating the finishing machine in this test, the screed rails shall be checked for deflection and proper adjustment, the cover on slab reinforcement, and forms checked.

All necessary corrections shall be made before concreting is begun. At no time shall the amount of concrete carried forward ahead of the screed be sufficient to cause slipping of the finishing machine wheels on the rails.

b. Hand Method. After the concrete is placed, it shall be struck off with a template or a vibrating screed. Concrete shall be finished to an even surface by means of both longitudinal and transverse floats. The use of a power trowel will not be permitted.

c. Straightedging. While the concrete is still plastic, the surface of the concrete shall be tested for trueness by the Contractor. For this purpose the Contractor shall furnish and use an approved 10 ft. (3 m) straightedge. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the whole area gone over from one side of the slab to the other as necessary. Advance along the surface shall be in successive stages of not more than one half the length of the straightedge. Any depressions found shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meets the requirements for smoothness. Straightedging and surface correction shall be done from foot bridges resting on the side forms and spanning, but not touching the concrete. Straightedge testing and surface corrections shall continue until the entire surface is found to be free from observable departures from the straightedge and the slab conforms to the required grade and cross section.

d. Final Finish. After the deck slab has been screeded it shall be floated, if necessary, to produce a uniform surface free from porosity. The surface shall then be given a steel tine finish. The tines shall be 1/8 in. (3 mm) wide and spaced at ½ - ¾ in. (12-20 mm) intervals. Depth

of tined grooves is intended to be 1/8 – 3/16 in. (3-5 mm). Check groove depth according to the "Procedure" portion of AASHTO T 261. If more than three (3) readings in a set of ten (10) are outside the intended depth range, make adjustments to the tining operation.

Perform the tining in such a way as to minimize surface tearing or aggregate removal.

The tine stroke shall be transverse to the roadway centerline and shall be for the full width of the roadway except for strips 12 in. (300 mm) wide along curb faces, which shall be troweled smooth. Adjacent strokes shall not be overlapped. The finished surface shall be free from porous spots, irregularities, depressions, small pockets, or rough spots.

With approval, the Contractor may saw-cut grooves in lieu of the steel tine finish specified above. The width and spacing of the grooves shall be 1/8 – 1/4 in. (3-5 mm). Saw-cut grooving must occur after the curing duration. Residue from the grooving operation must be continuously and completely removed while grooving.

For structures that will receive a deck membrane and asphalt overlay, the concrete shall be given a screed or float finish. The surface, as finished, shall be free from porous spots, irregularities, depressions, small pockets, or rough spots.

e. Surface Smoothness. At the end of the curing period, the slab surface will be tested for smoothness by Idaho T-87. The surface shall vary in no place more than ¼ in. (5 mm) in 10 ft. (3 m) from the lower edge of the straightedge and 90 percent of the readings shall not exceed 1/8 in. (3 mm) in 10 ft. (3 m). Concrete surface that does not meet surface smoothness requirements will be ground or replaced as directed by the Engineer at the Contractor's expense.

J. Curing Concrete. Concrete surfaces shall be kept completely and continuously moist until a curing method is applied. Membrane forming curing compound shall not be applied to concrete surfaces before the finishing has been accepted and shall not be applied to construction joints nor to the inside faces of joints to be sealed.

Concrete required to be painted shall be cured by either water, form, steam, or System 1 membrane-forming curing compound. The use of System 1 will require surface preparation before painting, refer to Subsection 502.03, Part K.

Concrete shall be cured as specified for the following types of concrete placement:

Placement No. 1	Bridge Decks, including sidewalks on bridges, bridge curbs or parapets.
Placement No. 2	-Sidewalks, urban approaches, curbs, or curb and gutter. -Approach slabs, and concrete slope paving.
Placement No. 3	- Pre-stressed Girders. - Concrete placements such as beams, caps, columns, footings, catch basins, manholes, median barrier, median curbs, box girders excluding the deck portion, signal, luminaries, and sign support foundations and other concrete. - Concrete Guardrail - Sound Walls

	A	B	C	D
Placement Number	Water Cure	Membrane forming Curing Compound System 1	Form Cure	Steam Cure
1	X			
2	X	X*		
3	X	X*	X	X

* Surface preparation shall be required if concrete is specified to be painted.

Concrete shall be cured by one of the following methods:

A. *Water Cure*. Immediately after surface finishing is completed on each individual portion of the placement, a single application of a membrane forming curing compound shall be made. The membrane forming curing compound shall be applied under pressure at a rate of not less than 1 gal. per 150 SF (1L per 4 m^2). System 1 membrane forming curing compound shall be used on Placement Numbers 2 & 3. System 2 membrane forming curing compound shall be used on Placement Number 1. Water curing shall begin after the concrete surface has set up enough so it will not be damaged, but not later than four hours following application of the curing compound.

Water curing shall consist of keeping the concrete surface continuously wet for a period of at least five days, except for decks, curbs, parapets, approach slabs and sidewalks on bridges, which shall be kept continuously wet for ten days.

Finishing of the parapet may take place during the wet cure period. Small isolated areas of the parapet may have the burlap removed to allow finishing if the surface of the concrete is not allowed to dry out.

Cotton mats, rugs, carpets, burlap, or other approved coverings may be used as a reservoir medium to keep the concrete surface wet. The reservoir medium shall be saturated with water prior to placement on the concrete surface. The reservoir medium shall be in a saturated state, drained of all free water, when initially placed. Water shall be added as necessary to keep it from drying out during the curing period. The reservoir medium may be covered with white plastic sheeting to reduce evaporation. Plastic sheeting alone shall not be used as a reservoir medium. At the end of the curing period, the surface shall be cleared of all reservoir mediums.

Prior to placement of concrete the Contractor shall demonstrate that he has the capability of providing the water cure as specified.

Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concrete placing operations.

B. *Membrane Forming Curing Compounds*. Membrane forming curing compounds shall conform to the requirements of Subsection 709.01, and shall be applied to the finished concrete immediately after the bleed water or free water sheen leaves the surface of the finished concrete surface.

Membrane forming curing compounds shall be thoroughly mixed before use and agitated during application to prevent settling of the suspended solids.

The membrane must be uniformly applied.

When two coats of membrane are used, the second coat shall be applied at right angles to the first coat, if possible.

Prior to completion of the curing period if any membrane surface is marred or damaged by scuffing and wear, the Contractor shall immediately apply the same type membrane or water cure for the remaining cure period.

Each manufacturer's identified lot of curing compound shall be sampled, tested and approved by the Engineer before used. Allow 2 weeks for laboratory testing of the curing compound once it has been received by the Central Materials Laboratory. Quantities of curing compound over 1000 gal. (4000 L) can be inspected and sampled by the State at the manufacturer's plant for acceptance testing. All such inspection shall be requested by the Contractor to the Engineer and the Central Materials Laboratory, Chemistry Section, in writing 30 days prior to ordering material.

1. System 1 – AASHTO M 148, Type 1 D, Class B with Fugitive Dye. All concrete cured by this method shall receive two applications of the curing compound for a total coverage of 1 gal. per 150 SF (1 L per 4m^2). Each application of the curing compound shall be applied under pressure at rate of not less than 1 gal. per 300 SF (1 L per 7.5 m^2). If the surface under the forms has dried, the concrete shall be thoroughly wet with water and the curing compound applied just as the surface film of water disappears. The first coat shall be applied immediately after stripping the forms and acceptance of the concrete finish. The second application shall be applied immediately after the first application has set. During curing operations all unsprayed exposed surfaces shall be kept wet with water.

2. System 2 – AASHTO M 148, Type 2, Class B, White Pigmented. Curing Compounds shall be applied under pressure at a rate of not less than 1 gal. per 150 SF (1 L per 4m^2) on all surfaces.

C. *Form Method*. Concrete shall be protected by forms for at least seven (7) days. Forms shall be intermittently moistened and protected from the sun during daytime periods of hot weather. Exposed surfaces shall be cured by water or approved membrane cure.

D. *Steam Curing*. When steam curing is used, there shall be a minimum 2-hour period through which the concrete is protected within a temperature range of 10° to 50°F to 100°F (38°C). Following this initial period, the temperature shall be increased at a maximum rate of 40°F or 22°C per hour, to a temperature between 100°F and 175°F (38°C and 79°C).

Curing at this temperature shall continue until cylinder strengths are above the release strength for prestressed reinforced concrete or above 80 percent of the intended 28-day strength, whichever is greater.

Upon completion of the cure cycle, when ambient air temperatures are below 40°F (4°C), the beam shall be cooled gradually by decreasing its temperature at a rate not to exceed 40°F or 22°C per hour until the temperature differential between the beam and outside air does not exceed 25°F or 14°C.

No member shall be exposed to below freezing temperatures until at least six days after fabrication, or until the 28-day strength has been achieved.

E. *Painting Concrete*. Concrete surfaces on bridges shall be painted in accordance with Subsection 627.03.

502.04 Method of Measurement. Precast stringers, prestressed stringers and concrete parapets shall be measured by the foot (meter). Approach slabs will be measured by the square yard (square meter) and include the exposed finished surface of the Concrete Deadman. Other concrete will be measured by the cubic yard (cubic meter) in accordance with the dimensions shown on the plans or ordered except that the volume of concrete placed under water and formed Class 15 (Class 10.5) concrete may be based on batch design volumes. No deduction will be made for the volume occupied by the reinforcing steel, anchors, conduits, weep holes, H piling, or chamfers. The volume of concrete displaced by culverts or piles, other than H piling, will be deducted.

Deck concrete will be measured by the square yard (square meter) or cubic yard (cubic meter) to the dimensions as shown on the plans.

502.05 Basis of Payment. Payment for accepted work will be made as follows:

A. *Concrete*. The accepted quantities of this item will be paid for at the contract price per cubic yard (cubic meter) or square yard (square meter) for concrete of the class and schedule called for complete in place. Payment for Schedule 2 concrete will be made on "plan quantities", as specified in Subsection 109.01.

B. *Precast and Prestressed Stringers, Slabs and "T" Beams*. The accepted quantities of this item will be paid for at the contract price per foot (meter) complete in place. The contract price shall include reinforcing steel, epoxy coating of any steel entirely or partially embedded in the precast elements if required, prestressing if required, and any structural steel which is cast in and included with precast elements. Payment will be made on plan quantities, except for authorized additions or deletions.

C. *Concrete Parapet.* The accepted quantities of this item will be paid for at the contract unit price per foot (meter) in place, which price shall include reinforcing steel and epoxy coating, if required, which is cast within the parapets in whole or in part.

D. *Approach Slabs*. The accepted quantities of this item will be paid for at the contract unit price per square yard (square meter) in place, which price shall include site preparation including excavation or other shaping, reinforcing steel, joint sealers, sleeper beams, concrete deadman, and curbs as shown on the plans.

E. Concrete which is allowed to stay in place that fails to meet the specified strength, shall be subject to an adjustment in price in conformance with Subsection 502.01, Part B - Acceptance. The price adjustment shall be applied to the unit price of the class of concrete required and shall apply to the quantity of concrete represented by the individual strength tests. This price adjustment provision shall apply to the contract price of all other items of work by their respective units of measurement and payment, which incorporate concrete under Section 502. Should concrete be at incidental cost or included in the overall cost of an item, the Engineer will establish a value of the concrete proportional to the total contract price for purposes of establishing a price

reduction on the concrete which fails to meet specified strength, but is allowed to remain in place.

Pay Item	Pay Unit
Concrete Class ____	CY (m^3)
Concrete Class ____ Schedule No. ____	CY or SY (m^3 or m^2)
Seal Concrete	CY (m^3)
Precast Stringers ____ (Beam)	ft. (m)
Prestressed Stringers ____ (Beam)	ft. (m)
Concrete Parapet	ft. (m)
Approach Slab	SY (m^2)
Prestressed Slabs (w___ x d____)	ft (m)
Prestressed T Beam w___ x d____	ft. (m)
Prestressed Box Beam w___ x d____	ft. (m)

SECTION 503 - METAL REINFORCEMENT

503.01 Description. This work shall consist of furnishing and placing reinforcing steel in accordance with these specifications and in reasonably close conformity with the plans or as directed.

Separate bids may be taken on “Metal Reinforcement, Schedule No. 1” which shall cover the metal reinforcement placed in substructures, and “Metal Reinforcement, Schedule No. 2” which shall cover the metal reinforcement placed in superstructures. The schedule will be shown on the plans for the structures involved.

503.02 Materials. Materials shall meet the requirements specified in the following Subsections of Section 700 - Materials:

Reinforcing Steel	708.02
Epoxy Coated Metal Reinforcement	708.02
Dowel Bars	708.03
Tie Bars	708.04

Each shipment of reinforcing steel delivered to the project shall be accompanied by a completed ITD-914 with a copy of the mill test report attached for each heat included in the shipment. Field samples will be taken by the State for each heat number and bar size from material delivered to the project. The supplier must submit proper identification with each shipment delivered to a project worksite to allow the

State to readily identify each bar size by heat number. Reinforcing steel delivered that cannot be identified by heat number shall be rejected and replaced by the supplier at no cost to the State.

The Contractor shall order additional bars to compensate for the field sampling. Additional sampling of the replacement bars is not required. Cutting and splicing to obtain samples is not permitted. Complete fabricated bars are to be sampled and replaced. If bar configuration is such that two 36 in. (900 mm) long test specimens can be cut from one bar, then only one such bar constitutes a field sample. Otherwise, two complete fabricated bars constitute a single field sample.

Reinforcing steel spirals shall be fabricated with additional length to accommodate sampling. No cutting that would require splicing will be permitted to obtain samples.

All bar from failing heat numbers shall be rejected and replaced by the Contractor at no additional cost to the State.

503.03 Construction Requirements.

A. *Bar List and Bending Schedule.* The bar list and bending schedule are made for the purpose of arriving at an estimate of quantities. The Contractor shall verify the quantity, size and shape of the bar reinforcement against the structure drawings and make any necessary corrections before ordering. Errors in the bar list and bending schedule shall not be cause for adjustment of contract unit price.

B. *Protection of Material.* Steel reinforcement shall be protected at all times from damage. When placed in the work, it shall be free from dirt, detrimental scale, paint, oil, or other foreign substance. Epoxy-coated reinforcing steel shall not be stored outdoors by the contractor for more than two months. When stored outdoors, such bars shall be covered for protection against the elements and in such a manner that condensation does not form on the bars.

C. *Bending.* Field bending of reinforcing bars shall be performed only on bars conflicting with pre-stressing ducts, within anchorage recesses and as shown on plans or approved by the Engineer.

Field bending shall not be done:

1. On bar sizes larger than No. 7 (No. 22), unless approved;

2. When the application of heat is required and the ambient temperature is lower than 50°F (10°C) and wind velocity at the bending site exceeds 15 mph (25 km/h);

3. By using torch tips designed for flame cutting, when heat application is required;

4. By means of hammer blows or other impact loading.

When field bending steel reinforcing bars, the Contractor shall:

1. Make the bend gradually;

2. Apply heat as described in these specifications in bending bars sizes No.6 and No. 7 (No.19 and No. 22) or in bending bar sizes No. 5 (No. 16) and smaller when those bars have been previously bent. Previously unbent bar of sizes No. 5 (No. 16) and smaller may be bent without heating;

3. Use a bending tool equipped with a Bend Inside Diameter / Bar Diameter ratio of 8.

4. Limit any bend to a maximum of 90 degrees;

5. Straighten by moving a hickey bar (if used) progressively around the bend.

In applying heat for field bending steel reinforcing bars, the Contractor shall:

1. Use only rosebud type torch tips, designed to give a diffused flame;

2. Insulate any concrete within 6 in. (150 mm) of the heated bar area;

3. Ensure by means of temperature indicating crayons or other suitable means that the steel temperature at the end of a heating operation will be as follows:

1200°F to 1250°F (650°C to 675°C) for bar size No. 4 (No. 13)

1350°F to 1400°F (730°C to 760°C) for bar sizes No. 5 and No. 6 (No.16 and No.19)

1400°F to 1445°F (760°C to 785°C) for bar size No. 7 (No. 22);

4. Heat the entire length of the bend plus a 2 in. (50 mm) additional length on each side of the bend;

5. Maintain the steel temperature within the required range shown above during the entire bending process;

6. Bend the bar immediately after the required temperature has been reached;

7. Never cool bars artificially with water, forced air, by placing them on the ground or a concrete floor or other means.

8. Transport or install hot, bent bars after they have reached the ambient temperature.

Prior to bending bars in the field, the Contractor shall submit for approval a Field Bending Plan describing the proposed methods, tools, materials and handling of the field bent reinforcement, in accordance with these specifications.

D. *Placing and Fastening.* During the placing of concrete, reinforcing steel shall be firmly held in the position shown on the plans. Reinforcement position shall be maintained by means of stays, blocks, ties, hangers, or other approved supports. The supports for metal reinforcement shall not be spaced more than 4 ft. (1.2 m) apart transversally or longitudinally. If concrete blocks are used, they shall have appropriate tie wires or coated tie wires embedded in them during their forming stage and each block shall be tied to the reinforcing bar it supports to hold the block in place. Concrete blocks shall have approximately the same strength quality as the concrete placed around them. Plastic coated tie wire and plastic coated metal bar supports shall be required whenever they will be in direct contact with epoxy coated reinforcing. The use of pebbles, pieces of broken stone, broken concrete, metal pipe or wooden blocks will not be permitted. Additionally, top layers or mats of metal reinforcement in bridge decks shall be tied down to stirrups, shear studs, or in another approved manner, with such tiedowns located so that there is at least one tiedown per 16

SF (1.5 m^2) of deck surface; these tiedowns shall be of sufficient strength to prevent upward movement of reinforcement from any cause. Concrete deck reinforcing steel shall not deviate more than ±0.25 in. (±6 mm) in the vertical direction from the position shown on the plans.

Reinforcement in any member shall be placed and inspected before concrete is placed. Before any concrete is placed, all damage to epoxy coating of reinforcing steel, occurring during installation shall be repaired. Remove rust and contaminants from the steel surface and adjacent coating, by wire brushing, immediately before applying patching material. Use a patching material certified to meet AASHTO M284 and apply it in accordance with the manufacture's recommendations.

Reinforcing bars shall be tied at all intersections unless spacing is less than 1 ft. (300 mm) in each direction, when alternate intersections shall be tied. Where bundled bars are shown on plans, bundles shall be tightly tied at intervals not exceeding 3 ft. (1 m) with No. 16 (1.42 mm) black or plastic coated steel wire or larger. Except for precast items, welding of reinforcing steel is only permitted where shown on plans, or with written approval. Such welding shall, with the same exception, conform to AWS D1.4 "Structural Welding Code - Reinforcing Steel."

Reinforcing steel assemblies for pre-cast items may be welded instead of tied, subject to the conditions of this paragraph. Weld location shall be indicated on shop drawings. Welding is not permitted at the casting bed when any pre-stress reinforcement is present on the bed. Any design bars shown on project plans may be tack welded to extra No. 4 (No. 13) bars for positioning. Such tack welds shall not exceed 1 in. (25 mm) length, and shall be located only at the very ends of design bars. The extra bars shall be shown on shop drawings and identified as bars whose only function is to position the design bars. Such extra bars are subject to the same concrete cover requirement as design bars, and shall be located so as not to interfere with pre-stress reinforcement or other design details. These positioning bars may be welded to each other. If epoxy coated bars are specified, the positioning bars must also be coated. In addition, all welds and weld-damaged coating must be cleaned by wire brush and coated with a patching compound recommended by the epoxy supplier.

E. *Splices*. Reinforcement shall be furnished in the full length indicated on the plans except for column spirals. No splicing of bars, except where shown on the plans

and in the column spirals, will be permitted without written approval of the Engineer. The bars shall be rigidly clamped or wired at all splices in an approved manner.

No field splices of column spirals shall be permitted in the lower one -fourth or the upper one- fourth of the spiral. Welded splices in column spirals shall conform to the current edition of AWS D1.4 and shall meet the carbon equivalent requirements. Field splices in column spirals shall be by mechanical splices.

At locations where mechanical splices are required on the plans, the Contractor shall form mechanical splices for epoxy and non-epoxy coated bars with an Engineer-approved system, using mechanical couplers or other approved method that complies with this section. No welded splices will be allowed. All exposed components of the splice used for the epoxy-coated bars shall be epoxy-coated or protected from corrosion by other approved means.

Before splicing, the Contractor shall provide the Engineer with the following information for each shipment of splice material:

1. The type of series identification (and heat treatment lot number for threaded-sleeve splices).

2. The grade and size of the bar to be spliced.

3. A manufacturer's catalog with complete data on material and procedures.

4. A written statement from the Contractor that the system and materials will be used according to the manufacturer's instruction and all requirements of this section.

One tension test specimen splice shall be made to represent each lot of bars spliced in the field. A lot shall consist of every 50 epoxy coated or every 50 non-epoxy coated bars spliced in the field, of one size, by one operator. Each specimen shall be tensioned to destruction or to the specified ultimate strength, whichever is less. The Contractor shall perform tests in a qualified laboratory. Reports shall be promptly furnished to the Engineer. If any test specimen fails to meet the tensile strength requirements, two production splices from the lot represented by the specimen shall be cut out and tested by the Contractor. If

both retests meet tensile requirements, all splices in the lot will be accepted. If one or both retests fail to meet the requirements, all splices in the lot will be rejected. All costs of removal, testing, and replacing shall be borne by the Contractor.

All mechanical splices shall meet the following criteria:

1. All splices shall develop at least 125 percent of the yield tensile strength specified for the unspliced bar. The ultimate tensile strength of the sleeve shall exceed that of the other parts of the completed splice.

2. AASHTO M 31 (M 31 M) bars within a splice sleeve shall not slip more than 0.045 in. (1.1 mm) for Grade 60 (420) bars. The slippage shall be measured between gage points clear of the splice sleeve. Measurements shall be taken at initial load of 3000 psi (20.68 Mpa) and again after loading to 90 percent of the minimum specified yield strength for the unspliced bar and then relaxed to 3000 psi (20.68 Mpa).

Compensation. No separate compensation will be allowed for the cost of furnishing and installing mechanical splices, nor for their testing where required. All costs shall be considered subsidiary to the bid item for metal reinforcement.

503.04 Method of Measurement. Except as indicated elsewhere in the specifications, metal reinforcement will be measured by the pound (kilogram), based on the theoretical pound (kilogram) complete in place as shown on the plans or placed as ordered.

Epoxy coated metal reinforcement will be measured by the pound (kilogram) of reinforcing steel prior to coating, based on theoretical pound (kilogram) complete in place as shown on the plans or placed as ordered.

503.05 Basis of Payment. Except as indicated elsewhere in the specifications, the accepted quantities of Metal Reinforcement will be paid for at the contract price per pound (kilogram) complete in place. No allowance will be made for clips, wire, or other material used for fastening reinforcement in place.

The weight of the splice bars will be included in the weight for which payment is made if the splice bars are shown on the plans or ordered installed. No payment will be made for bars installed for the Contractor's convenience.

Payment for Schedule 2 Metal Reinforcement will be made on "plan quantities" as specified in Subsection 109.01. The accepted quantities of epoxy coated metal reinforcement will be paid for at the contract unit price per pound (kilogram) of steel.

No allowance will be made for plastic coated wires, supports or other material used for fastening epoxy coated reinforcement in place.

Payment for acceptable work will be made as follows:

Pay Item	**Pay Unit**
Metal Reinforcement	lb. (kg)
Metal Reinforcement, Schedule No. ____	lb. (kg)
Epoxy Coated Metal Reinforcement	lb. (kg)

SECTION 504 - STRUCTURAL METALS

504.01 Description.

A. *General*. This work shall consist of furnishing, fabricating, erecting and painting structural metals in accordance with these Specifications, the Special Provisions and the details shown on the plans or as directed.

B. *Fabricator Certification.* Fabricatiors of structural components for all vehicular bridges, other than unspliced rolled beam bridges, shall be certified under the AISC Quality Certification Program, Major Steel Bridges category. Fabricators of structural components for all unspliced rolled beam vehicular bridges and steel pedestrian bridges, shall be certified under the AISC Quality Certification Program, Simple Steel Bridge Structures category. This requirement does not apply to incidental sub-assemblies such as drainage components, expansion joints, handrails, lighting supports, or items of similar nature.

C. *Notice of Rolling and Fabrication.* The Contractor shall give ample notice to the Engineer of the beginning of the work at the mill or shop so that inspection may be provided. No material shall be manufactured, or work done in the shop, before the Engineer has been so notified.

D. *Inspection.* Structural steel will be inspected at the fabrication site. The Contractor shall furnish four copies of all mill orders, certified mill test reports and

shipping statements. Mill test reports shall show the chemical analysis and physical test results for each heat of steel used in the work.

With the approval of the Engineer, certificates of compliance shall be furnished in lieu of mill test reports for material that normally is not supplied with mill test reports, and for some items such as fills, minor gusset plates and similar material when quantities are small and the material is taken from stock.

Certified mill test reports for steels with specified impact values shall include, in addition to other test results, the results of Charpy V-notch impact tests. When fine grain practice is specified, the test report shall confirm that the material was so produced. Copies of mill orders shall be furnished at the time orders are placed with the manufacturer. Certified mill test reports and Certificates of Compliance shall be furnished prior to the start of fabrication of material covered by these reports. The Certificate of Compliance shall be signed by the manufacturer and shall certify that the material is in conformance with the specifications to which it has been manufactured.

Material to be used shall be made available to the Engineer so that each piece can be examined. The Engineer shall have safe and free access at all times to any portion of the fabrication site where the material is stored or where work on the material is being performed.

E. *Quality Control Inspection.* Quality control inspection and testing shall be the responsibility of the Contractor. The Contractor shall perform inspection and testing at least to the extent specified and in accordance with the ANSI/ AASHTO/ AWS D1.5 Bridge Welding Code, Section 6 - Inspection.

Nondestructive testing in addition to visual inspection, testing to base metal, production welds, weld repairs, procedure qualification test weldments and welder, welding operator and tacker qualification test weldments are included. Cost of nondestructive testing shall be considered incidental to the structural steel fabrication/erection and no separate payment will be made. The Contractor shall provide all facilities the Inspector requires to inspect material and workmanship.

F. *Inspector's Authority.* The Inspector may reject materials or workmanship that does not comply with these specifications. In any dispute, the Contractor may appeal to the Engineer whose decision shall be final.

By its inspection at the mill and shop, the state intends to facilitate the work and prevent errors. This inspection shall not relieve the Contractor of any responsibility for identifying and replacing defective material or workmanship.

Even if the Inspector accepts material or finished members, the state may later reject them if defective. The Contractor shall promptly replace or make good any rejected materials or workmanship.

G. *Shop Plans.* The Contractor shall submit for approval all shop detail plans for fabricating the steel. Unless otherwise directed by the Engineer, these shall be sent to the Bridge Design Engineer, Idaho Transportation Department, 3311 West State Street, P.O. Box 7129, Boise, ID 83707.

When the plans are submitted directly to the Bridge Design Engineer, a copy of the transmittal letter shall be sent to the Resident Engineer.

Six sets of the plans shall be supplied to the Bridge Design Engineer (four more sets are required for each affected railroad company on any grade separation structure that carries a railroad over a highway).

In approving shop plans, the state accepts only the nature and scope of the details without validating any dimensions.

Unless the Engineer permits it in writing, no changes shall be made in any drawing after its approval.

Before project completion, the Contractor shall furnish the Engineer one set of reproducible copies of the as-built shop plans. (One more set is required for each affected railroad company on any grade separation structure that carries a railroad over a highway.) The reproducible copies shall be clear, suitable for microfilming, and on permanent material.

Working drawings shall be 22 in. x 34 in. (559 mm x 864 mm) in size and each drawing and calculation sheet shall include the job site name of the structure as shown on the contract plans, District-County-Route, bridge number, contract number, and contract drawing number.

Welding procedures shall be submitted for approval with shop drawings. The procedures shall specify the type of equipment to be used, electrode selection,

preheat requirements, base materials, and joint details. When the procedures are not prequalified by AWS or AASHTO, evidence of qualification tests shall be submitted.

H. *Erection Plans.* The Contractor shall submit the proposed method for erection to the Engineer for approval. The erection procedure shall be reviewed by the steel fabricator prior to being submitted to the Engineer.

The Contractor shall include in the submittal calculations of the maximum stresses that each member will be subjected to during erection. These calculations will determine the necessity of using strongbacks or erecting the girders in pairs with cross frames installed to prevent the possibility of buckling the compression flange during erection of the girders. The calculation shall be stamped by a registered professional engineer. Any falsework or temporary structures shall meet the requirements of Section 502.03, Part E-*Falsework and Forms.*

Falsework and forms supporting the concrete work on steel structures shall be constructed so that any loads applied to girder webs shall be applied within 6 in. (150 mm) of a flange or stiffener and shall be distributed in a manner that will not produce local distortion of the web. Temporary struts and ties shall be provided as necessary to resist lateral and/or eccentric loads applied to the girders and to prevent appreciable relative vertical movement between the edge of deck form and the adjacent steel girder.

The erection procedure shall be supplemented with any necessary drawings to clearly describe the method proposed. The plan shall show details of all falsework bents, bracing, guys, temporary anchors, lifting devices, attachments to the bridge members, sequence of erection, location of lifting points on the bridge members, and weights of the members. The plan and drawings shall be complete in detail for all anticipated phases and conditions during erection.

The Contractor shall also submit complete plans of any temporary members or devices which affect stresses in the permanent members of the structure. All temporary or extra material required shall be removed and no payment shall be made for any extra material required due to the Contractor's erection procedures or method. In addition, no measurement or payment will be made for any material required in the permanent structure due to the Contractor's erection scheme.

Approval of the Contractor's erection plans, falsework, temporary material and equipment shall not be considered as relieving the Contractor of his full

responsibility for the practicability and safety of the erection schemes used or for carrying out the work in full accordance with the plans and specifications.

Any material ordered or shop drawings prepared prior to the review of the erection scheme by the Engineer shall be the responsibility of the Contractor.

The plan and drawings shall be submitted for approval as prescribed in Section 502.03 *Falsework and Forms.*

I. *Camber Diagram.* A camber diagram shall be furnished to the Engineer by the fabricator, showing the camber at each panel point in the cases of trusses or arch ribs, and at the location of field splices and tenth points of span length in the cases of continuous beam and girder or rigid frames. The camber diagram shall show calculated cambers to be used in preassembly of field connections.

504.02 Materials

A. *Structural Metals.* Materials shall meet the requirements of the plans and Subsection 708.06 - Structural Steel and Related Materials.

For all members identified on the plans as “Fracture Critical Member(s),” the additional fabrication, inspection and certificate requirements of the current AASHTO Guide Specifications for Fracture Critical Non-redundant Steel Bridge Members and current Interim Specifications shall apply.

Universal mill plates shall not be used for flange plates in designated tension stress or stress reversal areas.

Structural steel shall be classified as:

Structural carbon steel (to be used whenever the plans do not specify another classification), AASHTO M 270, Grade 36 (M 270M, Grade 250).

Structural low alloy steel, AASHTO M 270, Grade 50 and 50W (M 270M, Grade 345 and 345W).

Structural high strength steel, AASHTO M 270 Grade 485 (M 270M, Grade 485W).

Unless the Plans or Special Provisions state otherwise, the following shall be classified as structural carbon steel:

Shims; ladders; stairways; anchor bolts and sleeves; pipe fittings and fastening used in handrails; and other metal parts, even if made of other materials, for which payment is not specified.

B. *Painting.* When required on the plans the structural steel shall be painted in conformance with Section 627 Painting. Paint shall meet the requirements of Section 707 - Paint.

C. *Handling, Storing, and Shipping of Materials.* Markings applied at the mill shall distinguish structural low alloy steel from structural carbon steel. The fabricator shall keep the two classes of steel carefully separated.

Before fabrication, all material stored at the fabricating plant shall be protected from rust, dirt, oil, and other foreign matter. The state will not accept rust-pitted material.

After fabrication, all material awaiting shipment shall be subject to the same storage requirements as unfabricated material.

All structural steel shall arrive at the job in good condition. As the Engineer requires, steel damage by saltwater shipment shall be thoroughly cleaned by high pressure water flushing, chemical cleaning or sandblasting, and repainted with the specified shop coat.

All material shall be stored so as to prevent rust and loss of small parts. Piled material shall not rest on the ground or in water but on skids or platforms.

The loading, transporting, unloading, and piling of the structural steel material shall be so conducted that the metal will be kept clean and free from injury from rough handling.

After fabrication, girders and beams shall remain upright during shipment, handling and storage unless otherwise approved in writing by the Engineer. Long members, such as columns and chords, shall be supported on skids placed near enough together to prevent damage from deflection.

In field assembly of structural parts, the Contractor shall use methods and equipment not likely to twist, bend, deform, or otherwise injure the metal. Any member slightly bent or twisted shall be corrected before it is placed. The state will reject any member with serious handling damage.

Scratches and gouge marks caused by handling and lifting, and located in tension or stress reversal regions, shall be repaired. Repair shall consist of grinding to a surface finish of ANSI 125 or better and inspecting by the dye penetrant or magnetic particle method. If such marks are located in an area where they will be covered or partly covered by a structural weld, the grinding and testing shall be done before welding.

Girder sections shall be handled so as to prevent damage to the girders. Girders shall be laterally supported during shipment by blocking, removable flange bracing, bolting in pairs, or other approved method. The method of lateral support for the girders shall be shown on the shop drawings.

Members weighing more than 6000 lb. (2700 kg) shall have the weight marked thereon and removed after erection is completed.

D. *Castings.* This section's requirements for structural steel (including painting requirements) shall also apply to castings.

Castings shall be:

1. True to pattern in form and dimensions;

2. Free from pouring faults, sponginess, cracks, blow holes, and other defects in places that would affect strength, appearance, or value;

3. Clean and uniform in appearance;

4. Filleted boldly at angles; and

5. Formed with sharp and perfect arises.

Iron and steel castings and forgings shall be annealed before any matching, unless the plans state otherwise.

504.03 Construction Requirements.

A. *Identification of Steels During Fabrication.* The Contractor shall submit for the Engineer's approval a written plan for visibly marking the material so that it can be traced. These marks shall remain visible at least through the fit-up of the main load-carrying tension members. The marking method shall permit the Engineer to verify:

1. material specification designation;

2. heat number; and

3. material test reports to meet any special requirements.

For steel in main load-carrying tension members and in tension components of flexural members, the Contractor shall include the heat numbers on the reproducible copies of the as-built shop plans.

B. *Edge Finishing.* All rolled, sheared, and flame cut edges shall be true to line and free of rough corners and projections. Corners along exposed edges shall be rounded to a radius of 1/16 in. (2 mm) or greater. Sheared edges on material more than 5/8 in. (16 mm) thick shall be planed, milled, ground or thermal cut to a depth of 1/4 in. (6 mm).

Surface roughness of flange plates in designated tension stress or stress reversal areas (rolled, sheared, and flame cut edges) shall not exceed 250 m in. (6 mm) as defined by ANSI specifications. On flame cut edges, this roughness may be obtained after cutting by grinding or other approved means.

Surface roughness of other rolled, sheared and flame cut edges shall not exceed 1,000 m in (25 mm), unless otherwise specified on the plans.

C. *Thermal Cutting.* The Contractor shall take steps to insure that the flame cut edges of main material are not hardened by the cutting process. This may be achieved by preheating, post heating or control of the burning process. Edge hardness for AASHTO M270M, Grade 345 and 345W plates after flame cutting found to have a Rockwell Hardness Value of C30 or greater will be considered unacceptable. Hardness shall be determined by AASHTO T 80. Plate edges shall be tested at least once for each fabrication piece or as directed by the

Engineer. Unacceptably hard surfaces shall be removed by approved grinding, machining, or approved heat treating procedures.

Flame cutting procedures for AASHTO M 270M, Grade 345/345W, and 690/690W, or other high strength low alloy steels shall include preheating to the following temperatures:

Thickness (t) of Thickest Part at Point of Cutting, in. (mm)		Temperature °F	(°C)
$t \leq 0.75$	$(t \leq 19)$	50	(10)
$0.75 < t \leq 1.5$	$(19 < t \leq 38)$	70	(21)
$1.5 < t \leq 2.5$	$(38 < t \leq 63.5)$	149	(65)
$t > 2.5$	$(t > 63.5)$	225	(107)

The plate shall be preheated in such a manner that the required temperature is obtained through the full thickness of the plate ahead of and laterally from the cut a distance of 3 in. (75 mm) or the plate thickness, whichever is greater.

Preheat temperatures shall be shown on the shop drawings.

D. *Fit and Bearing.* Ends of columns that bear on base and cap plates shall be milled to true surfaces and accurate bevels.

When assembled, caps and base plates of columns and the sole plates of girders and trusses shall have full contact. If warped or deformed, the plates shall be heat straightened, planed, or corrected in some other way to produce accurate, even contact. If necessary for proper contact, bearing surfaces that will contact other metal surfaces shall be planed or milled. Surfaces of warped or deformed base and sole plates that will contact masonry shall be rough finished.

On the surface of expansion bearings, the cut of the planer shall be in the direction of expansion.

Abutting ends of compression members shall be faced accurately so that they bear evenly when in the structure. On built-up members, the end shall be faced or milled after fabrication.

Ends of tension members at splices shall be rough finished to produce neat, close joints. A contact fit is not required.

Floor beams, stringers, and girders having end connection angles shall be flush with each other and set accurately in relationship to the position and length of the member. Unless the plans require it, end connection angles shall not be finished. If, however, faulty assembly requires them to be milled, milling shall not reduce thickness by more than 1/16 in. (2 mm).

The various pieces forming one built member shall be straight and close-fitting, true to detailed dimensions, and free from twists, bends, open joints, or other defects.

For field-bolted splices, the clearance between web plates shall not exceed 3/8 in. (10 mm).

Bearing stiffeners shall be milled to bear so that they will bear evenly against the flange. Intermediate stiffeners shall fit tightly enough to exclude water after painting.

E. *Grinding.* All plates shall be ground so that the direction of grinding is parallel with the direction of tensile or compressive stress; the direction of grinding shall be shown on the shop plans.

F. *Camber.* Cambering in the plane parallel to the strong axis of the girder shall not be done by the use of heat or mechanical bending. For plate girders, the web shall be cut to the prescribed camber with suitable allowance for shrinkage due to cutting, welding, and heat curving.

G. *Curvature.* Girder curvature in an axis parallel to the girder web as shown in the plans shall be produced by fabrication methods that follow AASHTO Specifications for Highway Bridges, Division II-Construction, or as approved by the Engineer.

H. *Pins and Rollers.* Pins and rollers shall be made of the class of forged steel the plans specify. They shall be turned accurately to detailed dimensions, smooth, straight, and flawless. The final surface shall be produced by a finishing cut.

Pins and rollers more than 9 in. (225 mm) in diameter shall be forged and annealed. Pins and rollers 9 in. (225 mm) or less in diameter may be either forged and annealed or cold finished carbon steel shafting.

In pins larger than 9 in. (225 mm) in diameter, a hole not less than 2 in. (50 mm) in diameter shall be bored full length along the axis after the forging has been allowed to cool to a temperature below the critical range and before being annealed. Such cooling shall be done under conditions which will prevent injury by cooling too rapidly.

Pin holes shall be bored true to detailed dimensions, smooth and straight, and at tight angles to the axis of the member. Holes shall be parallel with each other unless the plans state otherwise. A finishing cut shall always be made.

The distance between holes shall not vary from detailed dimensions by more than 1/32 in. (1 mm). In tension members, this distance shall be measured from outside to outside of holes; in compression members, inside to inside.

Each pin shall be 1/50 in. (0.5 mm) smaller in diameter than its hole. All pins shall be numbered after being fitted into their holes in the assembled member. All pins shall be magnetic particle tested in accordance with ASTM A275 by an independent testing laboratory. Pins with inner defects will be rejected.

The Contractor shall provide two pilot and two driving nuts for each size of pin unless the plans state otherwise.

I. *Machine Finished Surfaces.* As soon as possible and before they leave the shop, machine-finished surfaces on abutting chord splices, column splices, and column bases shall be covered with grease. After erection, the steel shall be cleaned and painted as specified.

All surfaces of iron and steel castings milled to smooth the surface shall be painted with the primer called for in the specified paint system.

While still in the shop, machine-finished surfaces and inaccessible surfaces of rocker or pin-type bearings shall receive the full paint system. Surfaces of pins and holes machine-finished to specific tolerances shall not be painted. But as soon as possible and before they leave the shop, they shall be coated with grease.

J. *High Strength Bolt Holes.*

1. *General.* At the Contractor's option, subject to the condition described in this

section, holes may be punched or sub-punched and reamed, drilled or sub-drilled and reamed, or formed by numerically controlled drilling operations.

The hole for each high strength bolt shall be 1/16 in. (2 mm) larger than the nominal diameter of the bolt less than 1 in. (25 mm) in diameter and 1/8 in. (3 mm) larger for bolts with diameters greater than 1 in. (25 mm).

In forming any connection, the fabricator may drill holes full size from the solid with all thickness of material assembled in proper position. If the fabricator chooses not to use this method, then these methods apply:

a. Holes shall be sub-punched or sub-drilled, then reamed full size after assembly in all connections and splices in the main members of trusses, arches, continuous beam spans, bents, towers, plate girders, box girders, and rigid frames.

b. Holes may be drilled full size unassembled to a steel template for splices of rolled beam stringers that continue over floorbeams or crossframes.

c. Holes shall be sub-punched and reamed full size to a steel template or reamed full size while assembled for end connections of rolled beam stringers and floorbeams or crossframes.

If steel templates are used to ream or drill full-size connection holes, the templates shall be positioned and angled with extreme care and bolted firmly in place. Templates for reaming matching members or the opposite faces of one member shall be duplicates. Templates for connections on like parts or members shall be located with such accuracy that match-marks are not needed.

Bolt holes in crossframes, gussets, lateral braces, and other secondary members may be punched or drilled full size from the solid while assembled.

2. *Punched Holes*. For punched holes, die diameter shall not exceed punch diameter by more than 1/16 in. (2 mm). Any hole requiring enlargement to admit the bolt shall be reamed. All holes shall be cut clean with no torn or ragged edges. The State will reject components having poorly matched holes.

After shop assembly and before reaming, all punched, sub-punched, and sub-drilled holes shall meet the following standard of accuracy. At least 75 percent of the holes in each connection shall permit the passage of a cylindrical pin 1/8 in. (3 mm) smaller in diameter than nominal hole size. This pin shall pass through at right angles to the face of the member without drifting. All holes shall permit passage of a pin 3/16 in. (5 mm) smaller in diameter than nominal hole size. The State will reject any pieces that fail to meet these standards.

3. *Reamed and Drilled Holes.* Reaming and drilling shall be done with twist drills, producing cylindrical holes perpendicular to the member. Reamers and drills shall be directed mechanically, not hand-held.

   Connecting parts that require reamed or drilled holes shall be assembled and held securely as the holes are formed, then match-marked before disassembly.

   The Contractor shall provide the Engineer a diagram showing these match-marks. The State will reject components having poorly matched holes.

   Burrs on outside surfaces and mating surfaces shall be removed. If the Engineer requires, the Contractor shall disassemble parts to remove burrs.

   At least 85 percent of all holes in a connection of reamed or drilled holes shall show no offset greater than 1/32 in. (1 mm) between adjacent thicknesses of metal. No hole shall have an offset greater than 1/16 in. (2 mm).

   Centerlines from the connection shall be inscribed on the template and holes shall be located from these centerlines. Centerlines shall also be used for accurately locating the template relative to the milled or scribed ends of the members.

   Templates shall have hardened steel bushings inserted into each hole. These bushings may be omitted, however, if the fabricator satisfies the Engineer that:

   a. that the template will be used no more than 5 times; and

   b. that use will produce no template wear.

Each template shall be at least 1/2 in. (12 mm) thick. If necessary, thicker templates shall be used to prevent buckling and mis-alignment as holes are formed.

4. *Numerically Controlled Drilled Connections.* In forming any hole described in this subsection, the fabricator may use numerically controlled (N/C) drilling or punching equipment if it meets the requirements in this subsection.

   The Contractor shall submit for approval a detailed outline of proposed N/C procedures. This outline shall:

   a. Cover all steps from initial drilling or punching through check assembly.

   b. Include the specific members of the structure to be drilled or punched, hole sizes, locations of the common index and other reference points, make-up of check assemblies, and all other information needed to describe the process fully.

   N/C holes may be drilled or punched to size through individual pieces, or may be drilled through any combination of tightly clamped pieces.

   When the Engineer requires, the Contractor shall demonstrate that the N/C procedures consistently produces holes and connections meeting the requirements of these Specifications.

5. *Fitting for Bolting.* Before drilling, reaming, and bolting begins, all parts of a member shall be assembled, well pinned, and drawn firmly together. If necessary, assembled pieces shall be taken apart to permit removal of any burrs or shavings produced as the holes are formed. The member shall be free from twists, bends, and other deformation.

   In shop-bolted connections, contacting metal surfaces shall be blast cleaned before assembly. Blasting shall meet the requirements of the SSPC Specifications for Commercial Blast Cleaning (SSPC-SP 6).

   Any drifting done during assembly shall be no more than enough to bring the parts into place. Drifting shall not enlarge the holes or distort the metal.

K. *Assembly.*

1. *Progressive Truss or Girder Assembly.* Unless the contract plans state otherwise, the Contractor shall use progressive truss or girder assembly methods as described below. The Contractor shall obtain the Engineer's approval of both the shop assembly and the erection methods before work begins.

   Each truss or girder is assembled in stages over the full length of the superstructure.

   a. For trusses. The first stage shall include at least three contiguous panels.

   b. For girders. The first stage shall include at least three contiguous shop sections.

   After stage one has been completed, each next stage shall be assembled to include at least one panel or shop section of the previous stage, repositioned, if necessary, and pinned to ensure accurate alignment; and two or more panels or shop sections added at the advancing end.

   If the bridge is longer than 150 ft. (45 m), each stage shall be at least 150 ft. (45 m) long, regardless of the length of individual continuous panels or shop sections.

   The Contractor shall perform the assembly sequence in the same order as the structure will be assembled in the field.

2. *Check of Shop Assembly.* The Contractor shall check each assembly for alignment, accuracy of holes, fit of milled joints, and other assembly techniques. Drilling or reaming shall not begin until the Engineer has given approval. If the Contractor uses N/C drilling, this approval must be obtained before the assembly or stage is dismantled.

3. *Blasting Cleaning.* For painted structures after fabrication, the Contractor shall blast clean all structural steel (except machine-finished surfaces) to a "near white" finish in accordance with the Steel Structures Painting Council SSPC-SP10. The "near white" surface is shown in the pictorial standards

of SSPC-Vis 1-67T as A Sa 2.5 and C Sc 22.5. After blasting and before painting, the Contractor shall remove all loose dust and dirt that remains on the steel. Acid shall not be used to remove scale or stains.

For unpainted weathering steel structures, after fabrication, all steel surfaces, except those to be embedded in concrete, shall be blast cleaned in the shop in accordance with SSPC Specification for Commercial Blast Cleaning (SSPC-SP-6). The blasted appearance shall be equal to, or better than, BSa2 as shown in the pictorial standards of SSPC-VIS 1-89.

For blast cleaning after erection, refer to Subsection 504.03-N, *Erection,* (4.b). For blast cleaning faying surfaces, refer to Subsection 504.03–L, *Bolted Connections* (1) and Subsection 504.03–J, *Fitting for Bolting* (5.).

Also refer to 504.03 - N *Erection,* (4.) in this specification.

L. *Bolted Connections.*

1. *General.* All high strength bolted connections are slip critical unless specified otherwise. Painted structures require Type 1 or Type 2 bolts. Unpainted structures require Type 3 bolts. Direct tension indicators shall be mechanically galvanized on painted structures, and mechanically galvanized and epoxy-coated on unpainted structures.

   Bolts, nuts, hardened washers, and direct tension indicators shall be as specified in Subsection 708.06 Bolts.

   The Contractor shall clean all metal surfaces prior to fitting and bolting of the connection. When assembled, all joint surfaces, including surfaces adjacent to the bolt head and nut, shall be free of all dirt, road oil, and other foreign material. When splices are designated Class B, slip- critical, on the plans, the contact surfaces of splices shall be field inspected immediately prior to assembly to ensure that the surfaces are free of all mill scale, dirt, road oil, and other foreign material.

   Burrs that would prevent solid seating of the connected parts in the snug tight condition shall be removed.

   Paint is not permitted on the faying surfaces of slip-critical connections. On

faying surfaces of slip-critical connections, paint, including any inadvertent overspray, shall be excluded from areas closer than one bolt diameter, but not less than 1 in. (25 mm) from the edge of any hole and all areas within bolt pattern.

All material within the grip of the bolt shall be steel. There shall be no compressible material such as gaskets or insulation within the grip. Bolted steel parts shall fit solidly together after the bolts are tightened, and may be coated or non-coated. The slope of the surfaces of parts in contact with the bolt head or nut shall not exceed 1:20 with respect to a plane normal to the bolt axis.

Fasteners shall be protected from dirt and moisture at the job site. Only as many fasteners as are anticipated to be installed and tightened during a work shift shall be taken from protected storage. Fasteners not used shall be returned to protected storage at the end of the shift. Fasteners shall not be cleaned of lubricant that is present in as-delivered condition. Fasteners for slip critical connections which accumulate rust or dirt resulting from job site conditions, shall be cleaned and re-lubricated prior to installation.

A tension measuring device (a Skidmore-Wihelm calibrator or other acceptable bolt tension indicating device) shall be at all job sites where bolts in slip-critical joints or connections subject to direct tension are being installed and tightened. The tension measuring device shall be used to confirm:

a. the suitability to satisfy the requirements of Table 2 of the complete fastener assembly, including lubrication if required, to be used in the work;

b. calibration of the wrenches, if applicable;

c. the understanding and proper use of the method to be used by the bolting crew.

The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in the remainder of this subsection. The accuracy of the tension measuring device shall be confirmed through calibration by an approved testing agency at least annually.

All bolting and testing operations shall be inspected by the Engineer in order

to determine that the approved installation procedure is utilized and that the correct tension has been achieved. All testing operations completed without the presence of the Engineer shall be cause for rejection.

All high strength bolts, nuts, washers, and DTIs shall be stored under cover to protect them from rain, snow, dirt or other adverse conditions. Identification of heat number or production lot number shall remain with each type of bolting parts. Any bolting parts that are rusty, dirty, or have damaged threads shall not be accepted.

Before bolts are installed they shall be subject to a job site rotational-capacity test. The rotational capacity test shall be performed on each rotational-capacity lot. The test shall also be done if the bolts are installed in the shop. Hardened steel washers are required as part of the test although they may not be required in the actual installation procedure.

Bolt, nut, washer and DTI (when required) combinations as installed shall be from the same rotational-capacity lot.

The rotational-capacity test shall be done according to Section 708.06 Bolts Subsection 2.A.(4).

Nuts shall be located, wherever practicable, on the side of the member, which will not be visible from the traveled way. Nuts for bolts that will be partially embedded in concrete shall be located on the side of the member that will be encased in concrete.

The nut shall be turned tight while the bolt is prevented from rotating. Each bolt shall have a hardened washer under the nut. If the Engineer approves, the Contractor may reuse any M 164 bolt one time. Re-tightening a bolt loosened by the tightening of nearby bolts will not be considered reuse.

To begin bolting any connection, the Contractor shall install and tighten to snug-tight enough bolts to bring all parts into full contact with each other. “Snug-tight” means either the tightness reached by (1) a few blows from an impact wrench, or (2) the full effort of a man using a spud wrench.

After this initial tightening, bolts shall be installed and brought to snug-tight in all holes that remain in the connection. Then, beginning with bolts in the

most rigid part of the joint and working out to its free edges, the Contractor shall systematically tighten all bolts to specified tension.

When all bolts in a joint are tight, each bolt shall carry at least the proof load shown in Table 2.

TABLE 2
BOLT TENSION

English Units

Bolt Size in.	Minimum Bolt Tension (lbs.) AASHTO M 164 ASTM A325	AASHTO M 253 ASTM A490
0.5	12,050	14,900
0.625	19,200	23,700
0.75	28,400	35,100
0.875	39,250	48,500
1.0	51,500	63,600
1.125	56,450	80,100
1.25	71,700	101,800
1.375	85,450	121,300
1.5	104,000	142,500

SI Units

Bolt Size (mm)	Minimum Bolt Tension (kN) AASHTO M 164M	AASHTO M 253M
(16)	(91)	(114)
(20)	(142)	(179)
(22)	(176)	(221)
(24)	(205)	(257)
(27)	(267)	(334)
(30)	(326)	(408)
(36)	(475)	(595)

2. *Tightening Methods*. Unless otherwise shown on the plans, tightening shall be done by the direct-tension-indicator method.

   a. Direct Tension Indicator Tightening (DTI).

      (1) Installation. The Direct Tension Indicator (DTI) shall be located at the opposite end of the bolt from the part being tightened where possible. When the DTI is used next to a slotted or oversized hole, a hardened flat washer shall be placed between the DTI and the part being tightened; the DTI shall not be reused after tension has been applied to the bolt.

      (2) Bolt Tension. Bolt tension shall be in accordance with ASTM F959 and the following:

         (a) The gap for mechanically galvanized epoxy coated DTIs shall be measured at 0.005 in. (0.125 mm) or less. A nil gap condition may be cause for rejection. The Engineer may require any bolt with nil gap to be removed from the work and the bolt thread examined at no additional cost. If no necking is observed and the nut can run down the full length of the thread, then the bolt can be reinstalled with new DTIs.

         (b) Verification of DTI performance is required prior to the starting of installation of bolts in the bridge. The testing procedure shall be done in accordance with Procedure for Verification and Installation of High Strength Bolts with Direct Tension Indicators. This procedure is in Appendix A6 of Report No. FHWA-SA-91-031 dated May 1991, revised April 1992.

   b. Turn-of-Nut Method. After all bolts in the joint have been brought to snug tightness, the nuts shall be further tightened by the amount of rotation shown in Table 3.

      After snug tightening, but before final tightening, the Contractor shall match-mark with crayon or paint the outer face of each nut and the protruding part of the bolt. To ensure that this tightening method is followed, the Engineer will:

(1) observe as the Contractor installs and tightens all bolts; and

(2) inspect each match-mark.

Three bolts of the same grade, size, and condition as those under inspections shall be placed individually in a device calibrated to measure bolt tension. This calibration operation shall be done at least once each inspection day. There shall be a washer under the part turned in tightening each bolt if washers are used on the structure. If washers are not used on the structure, the material abutting the part turned shall be of the same specification as that used on the structure. In the calibrated device, each bolt shall be tightened by any convenient means to the specified tension. The inspecting wrench shall then be applied to the tightened bolt to determine the torque required to turn the nut or head 5° or approximately 1 in. at a 12 in. radius (25 mm at a 300 mm radius) in the tightening direction. The average of the torque required for all three bolts shall be taken as the job-inspection torque.

The Contractor, in the presence of the Engineer, shall inspect the tightened bolt using an inspection torque wrench.

Ten percent (at least two) of the tightened bolts on the structure represented by the test bolts shall be selected at random in each connection. The job-inspection torque shall then be applied to each with the inspecting wrench turned in the tightening direction. If this torque turns no bolt head or nut, the State will accept the connection as being properly tightened, but if the torque turns one or more bolt heads or nuts, the job-inspection torque shall then be applied to all bolts in the connection. Any bolt whose head or nut turns at this stage shall be tightened and re-inspected. The Contractor may, however, retighten all the bolts in the connection and resubmit it for inspection.

TABLE 3
TURN-OF-NUT TIGHTENING METHOD

Nut Rotation[1] from Snug-Tight Condition

Bolt Length l (Measured from underside of head to extreme end of point) washer)	(Both faces at right angles to bolt axis)	(One face at right angle to bolt axis, one face sloped no more than 1:20, without bevel	(Both faces sloped no more than 1:20 from right angle to bolt axis, without bevel washer)
l ≤ 4D	120° or 1/3 turn	180° or 1/2 turn	240° or 2/3 turn
4D ≤ 8D	180° or 1/2 turn	240° or 2/3 turn	300° or 5/6 turn
8D ≤ 12D [3]	240° or 2/3 turn	300° or 5/6 turn	360° or 1 turn

[1] Nut rotation is relative to the bolt regardless of which element (nut or bolt) is being turned. Tolerances permitted: plus or minus 30° for final turns of 180° - 1/2 turn or less; plus or minus 45° for final turns of 240° - 2/3 turn or more.

[2] D = nominal bolt diameter of bolt being tightened.

[3] When bolt length exceeds 12D, the rotation shall be determined by actual tests in which a suitable tension device simulates actual conditions.

M. *Welding.*

1. *General.* Welded fabrication shall be in accordance with ANSI/ AASHTO/ AWS D1.5 Bridge Welding Code and all Interim Revisions published by AASHTO as of the bid opening date except as modified in the remainder of the subsection or as shown on the plans.

   Welding of tubular members shall conform to the current addition of AWS D1.1 Structural Welding Code-Steel.

   Welding of sheet steel not exceeding 1/8 in. (3 mm) in thickness shall conform to the current addition of AWS D1.3 Structural Welding Code-Sheet Steel.

Welding of aluminum shall conform to the current addition of AWS D1.2 Structural Welding Code-Aluminum.

Welding of structural steel will be permitted only to the extent shown in the plans. No welding, including tack and temporary welding, shall be done in the shop or field unless the location of the welds is shown on the approved shop drawings or approved by the Engineer in writing.

Welding shall not begin until after the Contractor has received the Engineer's approval of shop plans, as required in Subsection 504.01 – G. *Shop Plans.* These plans shall include procedures for welding, assembly, and any heat-straightening or heat-curving.

2. *Preheating.* Preheat and interpass temperatures shall comply with the minimums in the table below:

Thickness (t) of Thickest Part at Point of Cutting, in. (mm)		**Temperature °F**	**(°C)**
$t \leq .0.75$	($t \leq 19$)	50	(10)
$0.75 < t \leq 1.5$	($19 < t \leq 38$)	70	(21)
$1.5 < t \leq 2.5$	($38 < t \leq 63.5$)	149	(65)
$t > 2.5$	($t > 63.5$)	225	(107)

The plate shall be preheated in such a manner that the required temperature is obtained through the full thickness of the plate ahead of and laterally from the cut a distance of 3 in. (75 mm) or the plate thickness, whichever is greater.

Preheat temperatures shall be shown on the shop drawings.

All web and flange plates, bearing stiffeners, bearing plates, and heavy sections (restrained when welded) shall be preheated to at least 250°F (120°C).

3. *Welding Procedures.* Unless otherwise approved by the Engineer, welding of main members and welding of attachments thereto shall be performed using only shielded metal arc, submerged arc, and/or stud welding, and all welding of butt splices and flange to web welds shall be

done using the automatic submerged arc process using continuous passes without interruption. Flux cored welding may be substituted with prior approval of the Engineer only in areas where automatic submerged arc welding is not feasible. Complete joint penetration groove welds made by flux cored arc welding may be approved only after submittal of performance of the joint qualification test prescribed in Section 5.7 and tested in accordance with Section 5.12 of the ANSI/ AASHTO/ AWS D1.5 Bridge Welding Code. Joint qualification tests shall be performed and submitted on each individual project. The test coupons shall be submitted to an independent testing laboratory for testing. All costs associated with the making of the test coupons and testing of the coupons shall be borne by the Contractor.

In shielded metal-arc welding, the Contractor shall use low-hydrogen electrodes.

In submerged-arc welding, flux shall be oven-dried at 550°F (288°C) for at least 2 hours, then stored in ovens held at 248°F (120°C) or more. If not used within 4 hours after removal from a drying or storage oven, flux shall be re-dried before use.

The Contractor shall not:

a. weld with gas metal arc, electrogas or electroslag methods;

b. weld when ambient temperature is below 20°F (-7°C); or

c. use coped holes in the web for welding butt splices in the flanges unless the plans show them.

Tack welds shall only be placed so that they are incorporated into the final weld and shall be subject to the same quality requirements as the final welds except that discontinuities such as undercut, unfilled craters, and porosity need not be removed before the final submerged arc welds. Tack welds shall be made with electrodes meeting the requirements of the final welds and shall be cleaned thoroughly. Multiple-pass tack welds shall have cascaded ends.

If groove welds (web-to-web or flange-to-flange) have been rejected, they may be repaired no more than twice. If a third failure occurs, the Contractor shall:

a. trim the members, if the Engineer approves, at least 1/2 in. (13 mm); or

b. replace the members at no expense to the State.

Welds shall be terminated at the end of the joint in a manner that will ensure sound welds. Whenever possible, this shall be done by the use of extension bars and runoff plates configured to duplicate the joint detail being welded. Extension bars and runoff plates shall be removed upon completion and cooling of the weld, and the ends of the welds shall be ground smooth and flush to minimum surface finish of ANSI 125. The ends of all groove welds shall be 100 percent inspected using dye penetrant or magnetic particle testing techniques. These shall include but not be limited to splices in individual flanges and webs, transverse and longitudinal stiffeners, floorbeams, and stringers.

Arc strikes outside the weld joint, on metal that will not be incorporated in a weld joint, may be cause for rejection of a member. All arc strikes on surfaces carrying tensile or reversal stress shall be reported in writing to the Engineer. Arc strikes on surfaces carrying tensile or reversal stress shall not be repaired without written authorization from the Engineer. Repair of arc strikes shall be accomplished by grinding the area containing the arc strike to a minimum surface finish of ANSI 125. The ground area shall be inspected by the dye-penetrate method and tested for heat-affected-zone hardness. If the testing specified above reveals cracking and/or hardness in excess of Rockwell C23, the area shall be weld repaired under the provisions of ANSI/AASHTO/AWS D1.5 Bridge Welding Code.

4. *Fillers.* All filler metal utilized for welding of unpainted AASHTO M270M, Grade 345W (M270, Grade 50W), bridge steel shall conform to the requirements of Table 4.3 of the current AWS Specifications.

When a bolted splice is used to join plates of differing thickness, filler plates used to compensate for the thickness difference shall not be welded into place unless approved in writing.

5. *Shear Connectors.* Shear connectors shall be shop welded using automatically timed stud welding equipment unless approved in writing by the Engineer.

   Any welded shear connector longer than 8 in. (200 mm) may be made of two shorter shear connectors joined with full-penetration welds.

6. *Welding Inspection.* The Contractor's welding inspection procedures, techniques, and inspector qualification shall comply with Current ANSI/AASHTO/AWS D1.5 Bridge Welding Code except as modified in the remainder of this subsection or as shown on the plans.

   Certified welding inspectors shall inspect all welds using these methods:

   a. Visual Inspection. Every weld shall be given a 100 percent visual inspection.

   b. Radiographic Inspection. Full-penetration groove welds subject to tension or reversal shall be given a 100 percent radiographic inspection. These welds include those in the tension area of webs, where inspection shall cover the greater of these two distances: 380 mm (15 in.) from the tension flange, or (2) one-third of the web depth from the tension flange.

   c. Magnetic Particle Inspection. Fillet welds, and longitudinal butt welds in webs shall be given a magnetic particle inspection. Magnetic particle test shall use the yoke method only.

      (1) Flange-to-Web Connections. Until the Engineer accepts the Contractor's record of quality control, 100 percent of all fillet welds in flange-to-web connections of built up members shall be inspected. After such acceptance, 30 percent of each weld shall be inspected. Ten percent of this inspection shall occur at each end of the welds length. The remaining 10 percent shall occur randomly at points selected by the Engineer.

(2) Boxed Members of Trusses. Each fillet weld in boxed members of trusses shall be given a 100 percent inspection.

(3) End and Intermediate Pier Diaphragms. Each fillet weld in end and intermediate pier diaphragms shall be given a 100 percent inspection.

(4) Longitudinal Butt Weld in Web. Each longitudinal butt weld in the web shall be inspected under the same requirements as flange-to-web connections (see above).

(5) Stiffeners and Connection Plates. Thirty percent of each fillet weld in transverse and longitudinal web stiffeners and connection plates shall be inspected. Ten percent of this inspection shall occur at each end of the weld. The remaining 10 percent shall occur randomly at points selected by the Engineer.

(6) Miscellaneous Weldments. Each fillet weld in miscellaneous weldments (such as bridge bearing assemblies) shall be given a 100 percent inspection.

d. Ultrasonic Inspection. All full-penetration groove welds shall be ultrasonically inspected.

(1) Transverse Flange and Web Splices. Each transverse groove weld on flange and web splices shall be given a 100 percent inspection.

(2) End and Intermediate Pier Diaphragms. Each groove weld on end and intermediate pier diaphragms shall be given a 100 percent inspection.

(3) Other Weldments. Each groove weld in other weldments shall be given a 100 percent inspection, unless the plans state otherwise.

e. Dye-Penetrant or Magnetic-Particle Inspection. The end of each groove weld at plate edges shall be given a 100 percent dye-penetrant or magnetic-particle inspection.

f. Other Inspection. The Contractor shall perform all additional testing as shown on the plans.

N. *Erection.*

1. *Erection Marks.* Erection marks to permit identification of members in the field may be painted on surfaces to be painted in the field. For unpainted AASHTO M270M, Grade 345W (M270 Grade 50W), erection marks shall be stamped with low stress intermittent dot steel die stamp in an area visible after completion of the structure. The maximum allowable depth of the impression shall be 0.010 in. (0.25 mm) and the tool shall conform with the following requirements:

Character Size in. (mm)	Minimum Character Face Radius in. (mm)	
1/8 (3)	0.007175	(0.175)
3/16 (5)	0.008200	(0.200)
1/4 (6)	0.010250	(0.250)

Impressions shall not be near the edge of tensile-stressed plate members.

2. *Alignment and Camber.* Before beginning field bolting, the Contractor shall:

a. adjust the structure to correct grade and alignment;

b. regulate elevations of panel points (ends of floorbeams); and

c. delay bolting at compression joints until adjusting the blocking to provide full and even bearing over the whole joint.

On truss spans, a slight excess camber will be permitted as the bottom chords are bolted. But camber and relative elevations of panel points shall be correct before the top chord joints, top lateral system, and sway braces are bolted.

The Contractor shall provide the Engineer with a diagram for each truss that shows camber at each panel point. This diagram shall display actual measurements taken as the truss is being assembled.

3. *Field Assembling and Bolting*. To begin bolting any field connection or splice, the Contractor shall install and tighten to snug-tight, enough bolts to bring all parts into full contact with each other prior to tightening these bolts to the specified minimum tension. "Snug-tight" means either the tightness reached by (1) a few blows from an impact wrench or (2) the full effort of a person using a spud wrench.

   Bolting a field connection shall be completed using one of the following methods:

   a. *Method A*. As erection proceeds, all field connections and splices for each member shall be securely drift pinned and bolted in accordance with 1 or 2 below before the mass of the member can be released or the next member is added. Field erection drawings shall specify pinning and bolting requirements that meet or exceed the following minimums:

      (1) Joints in Normal Structures. Fifty percent of the holes in a single field connection and fifty percent of the holes on each side of a single joint in a splice plate shall be filled with drift pins and bolts. Thirty percent of the filled holes shall be pinned. Seventy percent of the filled holes shall be bolted and tightened to snug-tight. Once all these bolts are snug-tight, each bolt shall be systematically tightened to the specified minimum tension. "Systematically tightened" means beginning with bolts in the most rigid part, which is usually the center of the joint, and working out to its free edges. The fully tensioned bolts shall be located near the middle of a single field connection or a single splice plate.

      (2) Joints in Cantilevered Structures. Seventy-five percent of the holes in a single field connection and 75 percent of the holes on each side of a single joint in a splice plate shall be filled with drift pins and bolts. Fifty percent of the filled holes shall be pinned. Fifty percent of the filled holes shall be bolted and tightened to snug-tight. Once all these bolts are snug-tight, each bolt shall be systematically tightened to the specified minimum tension. The fully tensioned bolts shall be located near the middle of a single field connection or a single splice plate. A joint in a cantilevered structure shall be defined as a field connection or splice that is on the unsupported or cantilevered side of a

support. Joints that fit this description in either their final position or temporary position (during erection) shall be considered as joints in cantilevered structures.

Drift pins shall be placed throughout each field connection and each field joint with the greatest concentration in the outer edges of a splice plate or member being bolted.

To complete a joint, the Contractor shall fill all remaining holes of the field connection or splice plate with bolts and tighten to snug-tight. Once all of these bolts are snug-tight, each bolt shall be systematically tightened to the specified minimum tension. After these bolts are tightened to the specified minimum tension, the Contractor shall replace the drift pins with bolts, tightened to the specified minimum tension.

b. *Method B*. The Contractor may complete a field bolted connection or splice in a continuous operation before releasing the mass of the member or adding the next member. The Contractor shall utilize drift pins to align the connection. The alignment drift pins shall fill between 15 and 30 percent of the holes in a single field connection and between 15 and 30 percent of the holes on each side of a single joint in a splice plate. Once the alignment drift pins are in place, all remaining holes shall be filled with bolts and tightened to snug-tight starting from near the middle and proceeding toward the outer gage lines. Once all of these bolts are snug-tight, the Contractor shall systematically tighten all these bolts to the specified minimum tension. The Contractor shall then replace the drift pins with bolts. Each of these bolts shall be tightened to the specified minimum tension.

All bolts shall be placed with heads toward the outside and underside of the bridge. All high-strength bolts shall be installed and tightened before the falsework is removed.

The Contractor may erect metal railings as erection proceeds, but railings shall not be bolted or adjusted permanently until the falsework is released and the deck placed.

The Contractor shall not begin painting until the Engineer has inspected and accepted field bolting.

4. *Surface Condition.* As the structure is erected, the Contractor shall keep all steel surfaces clean and free from dirt, concrete, mortar, oil, paint, grease, and other stain-producing foreign matter. Any surfaces that become stained shall be cleaned as follows:

   a. Painted steel surfaces shall be cleaned by methods required for the type of staining. The method shall be submitted to the Engineer for approval.

   b. Weathering steel surfaces. After the deck is placed, all concrete stains and other foreign matter shall be removed from the exposed surfaces of all structural steel members by power cleaning or other approved method. This cleaning is necessary to provide a surface for the formation of patina (oxide coating) which will give long term protection to the steel.

504.04 Method of Measurement

Structural metals will be measured by the pound (kilogram), foot (meter), or on a lump sum basis. Where payment is on a weight basis, the weights of rolled shapes and of structural steel plates shall be computed on the basis of their nominal weights and dimensions.

Steel forgings will be measured by the pound (kilogram) based on the plan dimensions and the theoretical weight of 0.2833 lb./in.^{3} (7842 kg/m^3).

Structural steel handrail, two tube curb mount rail, pedestrian/bicycle railing, and combination pedestrian/bicycle railing will be measured by the foot (meter), complete in place.

504.05 Basis of Payment

Payment will be made on “plan quantities” as specified in Subsection 109.01.

Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Steel Bridge	L. S.
Structural Steel	lb. (kg) or L. S.
Steel Forgings	lb. (kg)
Structural Steel Handrail	ft. (m)
Two Tube Curb Mount Rail	ft. (m)
Pedestrian/Bicycle Railing	ft. (m)
Combination Pedestrian/Bicycle and Traffic Railing	ft. (m)

SECTION 505 - PILING

505.01 Description. This work shall consist of the furnishing and driving of piles, including test piles, in accordance with these specifications and where shown on the plans, or as directed.

505.02 Materials. Materials shall meet the requirements specified in the following Sections or Subsections:

Concrete	502
Steel H-Piles	708.08
Steel Shell Piles	708.30
Timber Piles	710.05

505.03 Construction Requirements.

A. *General.* Test piles shall be of the same material, cross section and type as the piles shown on the plans, and shall be driven with the same pile driving hammer type and size as will be used for driving the rest of the piling.

When test piles are required, the balance of the piling shall not be ordered by the Contractor until the test pile driving results have been analyzed and the required pile lengths determined by the Engineer. Test piles shall be driven to refusal or 1.5 times the estimated pile penetration as shown in the plans, whichever comes first. If the required bearing capacity is not achieved when the test pile is driven to 1.5 times the estimated pile penetration, then the test pile shall continue being driven until the required bearing capacity has been achieved.

Piles shall not be driven until after the foundation excavation is complete. Unless otherwise directed, piles shall be driven to a minimum penetration of

one-third the pile length or 10 ft. (3 m) in dense or hard soil and 20 ft. (6 m) in loose or soft soil as determined by the Engineer, whichever is greater.

Piles shall be driven to the specified bearing capacity or refusal as required by the plans. A specified tip elevation may also be required by the plans.

If the required minimum penetration cannot be obtained with a hammer having the highest energy rating permitted, pre-drilling will be required.

Steel shell piles may be driven with a mandrel except on exposed pile bents.

The Contractor shall provide a suitable light on the job at all times for shell pile inspection.

B. *Caps and Collars.* Before placing timber piles into the leads, the pile butts shall be cut off square and the edges chamfered. Timber pile heads shall be provided with approved metal caps or collars, to prevent splitting. For driving steel H-piles and shell piles, a cast steel helmet assembly with a suitable hammer cushion shall be used. The helmet assembly shall closely fit the top of the steel H-pile or shell pile, and shall be of such design as has been proved satisfactory and shall be properly sized for the proper driving of the pile being used.

C. *Hammer Cushion*. The hammer cushion shall be removed from the helmet and be inspected in the presence of the Engineer before beginning pile driving at each structure or after each 100 hours of pile driving, whichever is less. Any reduction in hammer cushion thickness greater than 25 percent of the original thickness shall require the hammer cushion to be replaced by the Contractor before pile driving will be permitted to continue.

D. *Pile Tips and Cutting Shoes.* When required by the plans or ordered in writing, the piles shall be fitted with pile tip protectors or shoes of an approved design. The pile toe shall be carefully shaped to provide uniform, even bearing on the tip or shoe. Pile tips or shoes shall be installed by AWS certified welders in accordance with the manufacturer's written instructions.

E. *Gravity Hammers.* Gravity pile hammers shall have a ram mass of not less than 2,900 lb. (1300 kg), but in no case shall the hammer ram mass be less than the combined mass of the helmet assembly and the pile. The hammer fall shall be

so regulated as to avoid damage to the piles, and in no case shall exceed 15 ft. (4.5 m).

F. *Steam, Air, and Diesel Hammers.* Steam, air and diesel hammers shall develop an energy per blow of not less than 7,000 ft-lbs. (9,500 joules) per blow for timber piles and not less than 11,800 ft-lbs. (16,000 joules) per blow for all other pile types unless otherwise approved by the Engineer, or shown on the plans. The Contractor shall furnish the hammer type and all hammer operation specifications to the Engineer fifteen days prior to pile driving. The Engineer will then determine if the hammer is sufficient for pile driving by using a wave equation analysis and other judgments. Pile driving hammers shall be operated at the pressure and speed recommended by the manufacturer. The hammer operator's manual shall be available on site at all times during pile driving.

G. *Pile Bearing Capacity.* The pile driving criteria for determining the pile bearing capacity will be developed by the Engineer using a wave equation analysis.

The following dynamic formula will be used to determine the required pile capacity of piles when a wave equation analysis is not available.

ENGLISH

$$R_u = 1.75\,[E^{0.5}(\log(10N_b))] - 100$$

Where: R_u = The ultimate pile capacity (Kips).

E = The hammer energy (foot-pounds) at the field observed ram stroke.

$\text{Log}(10N_b)$ = Logarithm to the base 10 of the quantity 10 multiplied by N_b, the number of hammer blows per inch at final pile penetration.

METRIC

$$R_u = 7\,[E^{0.5}(\log(10N_b))] - 550$$

Where: R_u = The ultimate pile capacity (kN).

E = The hammer energy (Joules) at the field observed ram stroke.

$\log(10N_b)$ = Logarithm to the base 10 of the quantity 10 multiplied by N_b, the number of hammer blows per 25 mm at final pile penetration.

H. *Splicing.*

1. Timber Piles. Piles shall not be spliced except when approved by the Engineer.

2. Steel Piles. When splices are permitted for steel piles, such splices shall be made as shown on the plans by AWS certified welders. No more than two field splices prior to driving shall be permitted on any individual pile. Unless approved by the Engineer, the minimum pile section length that will be allowed for pile splicing will be 10 feet (3 m).

I. *Followers.* Followers shall be used only with approval of the Engineer. When followers are used, one pile out of every 10, with a minimum of one pile per group, shall be a long pile driven without a follower, and shall be used as a test pile to determine the pile group capacity.

J. *Loading Tests.* When required, pile capacities shall be determined by static loading tests. These tests shall be performed in accordance with ASTM D 1143.

K. *Storage and Handling of Timber Piles.* The method of storing and handling shall be such as to avoid damage to the piles. Special care shall be taken to avoid breaking the surface of treated timber piles.

L. *Cutting Piles.* Timber piles driven to near the cutoff elevation shall be carefully adzed or otherwise freed from all brooming, splintering, or any other damage.

When piles are completely driven, inspected and approved, they shall be neatly cut on a horizontal plane at the cutoff elevation(s) shown on the plans.

M. *Concreting.* Shell piles shall be completely filled with concrete after the cutoff has been removed unless otherwise specified on the plans.

Concreting of any shell pile will not be permitted until all debris and water inside the pile are removed to the satisfaction of the Engineer, and the shell is inspected and approved.

Concrete shall not be placed in any shell pile until all piling of that group or within a radius of 15 ft. (5 m) have been driven.

N. *Alignment, Location, and Orientation.* Piles shall be driven with a variation in plumbness of not more than 0.25 in./ft. (20 mm/m) from the vertical or from the batter shown on the plans. In addition, piles for trestle bents shall be so driven that the bent cap may be placed without inducing excessive stresses in the piles as determined by the Engineer. Excessive stresses will be determined by the Engineer, based on the loading conditions, pile type, and unsupported length. Pile locations at cutoff shall be within 6 in. (150 mm) of plan location. Further, the as-driven centroid of load for any pile group shall be within 5 percent of the plan location of the designed centroid of load. Plan orientation of H-piles shall be as shown in the plans. If the location and/or alignment tolerances specified in the preceding paragraphs are exceeded, the extent of overloading shall be evaluated and if, in the judgment of the Engineer, corrective measures are necessary, suitable measures shall be designed and constructed by the Contractor. The Contractor shall bear all costs, including delays, associated with the corrective action.

O. *Heaved Piles.* Level readings to check on pile heave after driving shall be made at the start of pile driving operations and shall continue until the Engineer determines that such checking is no longer required. Level readings shall be taken immediately after the pile has been driven and again after piles within a radius of 15 ft. (5 m) have been driven. If pile heave is observed, accurate level readings referenced to a fixed datum shall be taken on all piles immediately after installation and periodically thereafter as piles within a 15 ft. (5 m) radius are driven to determine the pile heave range. All piles that have been heaved vertically more than 1/4 in. (6 mm) shall be re-driven, at the Contractor's expense, to the required pile capacity.

P. *Installation Sequence.* The order of driving individual piles in pile groups shall be either starting from the center of the group and proceeding outwards in both directions or starting at the outside row and proceeding progressively across the group.

Q. *Defective Piles.* The method used in driving piles shall not subject them to excessive and undue abuse producing crushing and spalling of the concrete; splitting, splintering, and brooming of the wood; or deformation of the steel. Manipulation of piles to force them into proper position will require prior approval by the Engineer. Any pile damaged by reason of internal defects or by improper

driving, driven out of its proper location or driven below the pile cutoff elevation shall be corrected at the Contractor's expense. Corrections shall be made by one of the following methods, as approved by the Engineer, for the pile in question:

1. The pile shall be withdrawn and replaced by a new and, if necessary, a longer pile.

2. A second pile shall be driven adjacent to the defective or short pile, at a minimum distance of 1 ft. (0.3 m) or as directed by the Engineer.

3. The pile shall be spliced or built up, or a sufficient portion of the footing widened to properly embed the pile.

R. *Driving Pile Next To Concrete Less Than 28 Days Old.* To minimize the detrimental effects of pile driving vibrations on new concrete less than 28 days old, pile shall not be driven closer to the new concrete than the distance determined from the following formula:

$$D = C \times (\text{square root of } E)$$

Where: D = distance (feet or meters)
E = rated energy of pile driving hammer (foot-pounds or joules)
C = coefficient shown below based on the number of days of curing time.

Curing Time (days)	Coefficient C (English)	Coefficient C (Metric)	Curing Time (days)	Coefficient C (English)	Coefficient C (Metric)
1	0.34	0.090	6	0.12	0.032
2	0.23	0.060	7-9	0.11	0.029
3	0.18	0.047	10-13	0.10	0.026
4	0.15	0.040	14-20	0.09	0.023
5	0.13	0.035	21-28	0.08	0.020

505.04 Method of Measurement. Furnishing and driving piles and test piles will be measured by the foot (meter) for the pile length below cutoff.

The length of pile cut off to be measured will be those random lengths of piling which result from cutting off the tops of driven piles and not used in the work.

505.05 Basis of Payment. Furnishing and Driving Piles. The accepted quantities of these items will be paid for at the contract price per foot (meter) below cutoff for furnishing and driving timber piles, steel H-piles, steel shell piles; and furnishing and driving test piles complete in place. Steel and timber pile cutoffs will be paid for at 50 percent and 100 percent, respectively, of the purchase cost of material as shown on the seller's invoice, including freight charges. Pile cutoff lengths shall become the property of the Contractor and shall be removed from the site.

When driving shoes or pile tips are called for on the plans, the cost of furnishing and installing them will be made at the contract price per each.

Seal Concrete, Concrete Class 30 (Class 20.5), and Steel Reinforcement used with Steel Shell Piles shall not be paid for separately, but shall be considered incidental to the cost per foot (meter) of pile.

Splices required for pile lengths up to the plan estimated length will be considered incidental to the cost of furnishing and driving the piles. Additional splices required when pile lengths exceed the plan estimated length will be paid for at the following stipulated prices.

Pile pre-drilling will be paid for as extra work in accordance with Section 109.03, unless a contract item is provided for this work.

Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Furnishing & Driving Timber Piles	ft. (m)
Furnishing & Driving Steel Shell Piles	ft. (m)
Furnishing & Driving Steel H-Piles____ x ____	ft. (m)
Furnishing & Driving Test Piles	ft. (m)
Furnish & Install Pile shoes or tips	Each
Steel Shell or H-Pile Splice Attachment to Driven Pile	$250 Each
Field Splice Prior to Driving	$100 Each

SECTION 506 - PRE-STRESSING CONCRETE

506.01 Description. This work shall consist of pre-stressing pre-cast or cast-in-place concrete by furnishing, placing and tensioning of pre-stressing steel in

accordance with details shown on the plans, and as specified in these specifications and the special provisions.

This work shall include the furnishing and installation of any appurtenant items necessary for the particular pre-stressing system to be used, including but not limited to ducts, anchorage assemblies and grout used for pressure grouting ducts.

For cast-in-place pre-stressed concrete, the term "member" as used in this section shall be considered to mean the concrete which is to be pre-stressed.

Pre-stressing shall be performed by either pre-tensioning or post-tensioning methods unless the plans show only pre-tensioning details. If the plans show only pre-tensioning details, the use of a post-tensioning system will be allowed only if complete details of any necessary modifications are approved by the Engineer.

506.02 Materials. Pre-stressing reinforcement shall meet the requirements of subsection 708.05.

506.03 Construction Requirements.

General. The Contractor shall submit to the Engineer for review, complete details of the method, materials and equipment he proposes to use in the pre-stressing operations, including any additions or rearrangement of reinforcing steel or pre-stress reinforcing strands from that shown on the plans. Such details shall outline the method and sequence of stressing and shall include complete specifications and details of the pre-stressing steel and anchoring devices, working stresses, anchoring stresses, types of ducts and all other data pertaining to the pre-stressing operation, including the proposed arrangement of the pre-stressing steel in the members, pressure grouting materials and equipment. The Contractor shall submit elongation calculations based upon the sequence of stressing. The Contractor shall not cast any member to be pre-stressed before review of the shop detail drawings is complete. After approval of the shop drawings the Contractor shall furnish the state a reproducible mylar copy of the approved drawings. The size of all working drawings shall be 22 in. x 34 in. (559 mm x 864 mm).

Pre-cast, pre-stressed concrete manufacturing plants shall be certified by the Pre-stressed Concrete Institute plant certification program, in category B2 (pre-stressed miscellaneous bridge products), B3 (pre-stressed straight strand bridge members), or B4 (pre-stressed draped strand bridge members),

corresponding to the products specified. Proof of current certification shall be furnished prior to beginning production.

For the fabrication of pre-cast pre-stressed members, all provisions of the *Manual for Quality Control for Plants and Production of Pre-cast Pre-stressed Concrete Products* as published by the Pre-stressed Concrete Institute (edition current at time of bid opening) are hereby incorporated by reference in these Specifications, with the following exceptions:

1. Where they conflict with contract specifications, the contract specifications shall govern.

2. Failure of a wire in a pre-tensioning strand or post-tensioning tendon shall be cause for rejecting that strand or tendon.

   The post-tensioning Contractor must retain a Professional Engineer, who is experienced in post-tensioning operations. Said Professional Engineer shall be registered in at least one state of the United States, but need not, for the purpose of this specification, be registered in the state of Idaho. He shall be in charge of all post-tensioning operations and be present during all tensioning and grouting operations. Two weeks before the start of the post-tensioning operations, the post-tensioning Contractor shall submit the name of his Professional Engineer, the state(s) in which he is registered and his registration number(s); the date and place of post-tensioning to the Engineer in writing.

A. *Sampling and Testing.* Sampling and testing shall conform to the specifications of ASTM A 416 and ASTM A 421 and as specified in this section.

Samples from each size and each heat of pre-stressing bars, from each manufactured reel of pre-stressing steel strand, from each coil of pre-stressing wire, and from each lot of bar couplers to be used shall be furnished for testing. With each sample of pre-stressing steel wires, bars or strands furnished for testing, there shall be submitted a certification stating the manufacturer's minimum guaranteed ultimate tensile strength of the sample furnished.

All materials for testing shall be furnished by the Contractor at his expense. The Contractor shall have no claim for additional compensation in the event his work is delayed awaiting approval of the materials furnished for testing.

All bars of each size from each mill heat, all wire from each coil, and all strand from each manufactured reel to be shipped to the site shall be assigned an individual lot number and shall be tagged in such a manner that each such lot can be accurately identified at the job site. Each lot of anchorage assemblies and bar couplers to be installed at the site shall be likewise identified. All unidentified pre-stressing steel, anchorage assemblies, or bar couplers received at the site will be rejected.

The following samples of materials and tendons, selected by the Engineer from the pre-stressing steel at the plant or job site, shall be furnished by the Contractor to the Engineer well in advance of anticipated use:

1. For wire, strand, or bars, one 5 ft. (1.5 m) long sample for wire or strand, two 2 ft. (600 mm) long samples for bars. Samples of each size shall be furnished for each heat or reel.

2. If the pre-stressing tendon is a bar, one 5 ft. (1.5 m) length shall be furnished and in addition, if couplers are to be used with the bars, two 2 ft. (600 mm) lengths of bar equipped with one coupler and fabricated to fit the coupler shall be furnished.

The Contractor shall provide to the Engineer a calibration of the post-tensioning jacking system performed by the California Department of Transportation and shall provide the appropriate display settings for the state's electrohydraulic pressure cell system, as established by California Department of Transportation tests. In addition, a graph shall be prepared showing the gauge pressure in pounds per square inch, psi (kilopascals, kPa), and force in thousands of pounds, kips (kilonewtons, kN), plotted through the whole range of the post-tensioning calibration. Re-calibration of the jacking system will be required at intervals not exceeding three months or at any time it appears to the Engineer that the equipment is producing erratic results. For each calibration, a new set of charts from the calibration shall be furnished to the Engineer. The specified regular interval for re-calibration of equipment may be extended at the discretion of the Engineer upon conclusive evidence that there is no substantial change in the performance, but in no case shall such intervals exceed six months.

The release of any material by the Engineer shall not preclude subsequent rejection if the material is damaged in transit or later damaged and found to be defective.

B. *Shipment and Rust Protection.* All pre-stressing steel shall be protected against physical damage and rust and other results of corrosion at all times from manufacture to grouting or encasing in concrete. Pre-stressing steel that has sustained physical damage at any time shall be rejected. The development of visible rust or other results of corrosion shall be cause for rejection, when ordered by the Engineer.

Pre-stressing steel shall be packaged in containers or other shipping forms for the protection of the steel against physical damage and corrosion during shipping and storage. A corrosion inhibitor which prevents rust or other results of corrosion shall be placed in the package or form, or when permitted by the Engineer, may be applied directly to the steel. The corrosion inhibitor shall have no deleterious effect on the steel or concrete or bond strength of steel to concrete. Packaging or forms damaged from any cause shall be immediately replaced or restored to original condition.

Should the Contractor elect to use a corrosion inhibitor carrier type packaging material, the material shall conform to the provisions of Federal Specification MIL-P-3420.

The shipping package or form shall be clearly marked with a statement that the package contains high-strength pre-stressing steel and the care to be used in handling; and the type, kind and amount of corrosion inhibitor used, including the date when placed, safety orders and instructions for use.

If ordered by the Engineer, the Contractor shall submit the following for the corrosion inhibitor:

1. A sample, a list of chemicals and their proportions, and instructions for use.

2. Evidence that the pre-stressing steel will be protected from rust and other results of corrosion.

3. A Certificate of Materials in accordance with the provisions in Subsection 106.04.

When steam curing is used, pre-stressing steel for post-tensioning shall not be installed until the steam curing is completed.

When acceptable pre-stressing steel for post-tensioning is installed in the ducts after completion of concrete curing, and if stressing and grouting are completed within 10 calendar days after the installation of the pre-stressing steel, rust which may form during said 10 days will not be cause for rejection of the steel. Pre-stressing steel installed, tensioned and grouted in this manner, all within 10 calendar days, will not require the use of a corrosion inhibitor in the duct following installation of the pre-stressing steel. Pre-stressing steel installed as above but not grouted within 10 calendar days shall be subject to all the requirements in this section pertaining to corrosion protection and rejection because of rust.

Any time acceptable pre-stressing steel for pre-tensioning is placed in the stressing bed and is exposed to the elements for more than 36 hours prior to encasement in concrete, adequate measures shall be taken by the Contractor, as approved by the Engineer, to protect said steel from contamination or corrosion. No welds or grounds for welding equipment shall be made on the forms or on the steel in the member after the pre-stressing steel has been installed.

Ends of pre-tensioned members that will not be encased in concrete shall have exposed ends of the pre-stressing steel cleaned and painted. The surfaces shall be covered with two thick applications of zinc-rich paint conforming to the requirements of Military Specification MIL-P-21035.

The anchoring devices shall be recessed so that the ends of the pre-stressing steel and all parts of the anchoring devices will be at least 2 in. (50 mm) inside the end surface of the members, or a greater embedment if shown on the plans.

The surfaces of concrete against which concrete encasement over anchorage assemblies is to be placed shall be abrasive blast cleaned and clean aggregate exposed after grouting of the ducts has been completed. The recesses shall be filled with concrete and finished flush. The concrete shall be the same as that specified for superstructure concrete.

C. *Allowable Stresses and Losses.* Unless otherwise specified or shown on the plans, the average working stress in the pre-stressing steel shall not exceed 80 percent of the yield point stress of the pre-stressing steel. The maximum temporary tensile stress (jacking stress) in pre-stressing steel shall not exceed 75 percent of the specified minimum ultimate tensile strength of the pre-stressing steel. The pre-stressing steel shall be anchored at stresses (initial stress) that will

result in the ultimate retention of working forces of not less than those shown on the plans, but in no case shall the initial stress at the anchor exceed 70 percent of the specified minimum ultimate tensile strength of the pre-stressing steel.

Working force and working stress will be considered as the force and stress remaining in the pre-stressing steel after all losses, including creep and shrinkage of concrete, elastic compression of concrete, creep of steel, losses in post-tensioned pre-stressing steel due to sequence of stressing, friction and take-up of anchorage, and all other losses peculiar to the method or system of pre-stressing have taken place or have been provided for.

The stress loss in post-tensioned pre-stressing steel due to elastic shortening, shrinkage and creep of concrete, and relaxation of pre-stressing steel shall be as shown in the plans.

The following formula and friction coefficients shall be used in calculating friction losses in tendons:

T_0 = Txe (Ua + Kl)
T_0 = steel stress at jacking end
Tx = steel stress at any point x
e = base of Naperian logarithms
U = friction curvature coefficient
a = total angular change of pre-stressing steel profile in radians from jacking end to point x
K = friction wobble coefficient
l = length of pre-stressing steel from jacking end to point x

Type of Steel	Type of Duct	K	U
Wire or strand	Galvanized-rigid	0.0002	0.25
Plain bars	Galvanized	0.0002	0.15
Deformed bars	Galvanized	0.0003	0.30

D. *Equipment.* All pre-stressing steel shall be tensioned by means of hydraulic jacks so that the force in the pre-stressing steel shall not be less than the value shown on the plans.

Each jack used to stress tendons shall be equipped with either a pressure gage or a load cell for determining the jacking stress, at the option of the Contractor.

The pressure gage, if used, shall have an accurately reading dial at least 6 in. (150 mm) in diameter.

Load cell, if used, shall be provided with an indicator by means of which the pre-stressing force in the tendon may be determined. The range of the load cell shall be such that the lower 10 percent of the manufacturer's capacity will not be used in determining the jacking stress.

E. *Preparation and Stressing.* For pre-tensioning the pre-stressing elements shall be accurately held in position during stressing. Several units may be cast in one continuous line and stressed at one time. No bond stress shall be transferred to the concrete until the concrete has attained the compressive strength shown on the plans for such transfer of load. The elements shall be cut or released in such an order that lateral eccentricity of stress will be a minimum.

Prior to placing forms for closing slabs of box girder cells, the Contractor shall demonstrate to the satisfaction of the Engineer that all ducts are unobstructed.

For post-tensioning the pre-stressing steel is to be installed after the concrete has been placed. The Contractor shall demonstrate to the satisfaction of the Engineer that the ducts are free of water and debris immediately prior to installation of the pre-stressing steel. During installation, the Contractor shall ensure that the pre-stressing steel is laid out in an orderly manner corresponding with its final positioning in the ducts, free of overlaps and kinks. After installation and prior to post-tensioning any member, the Contractor shall demonstrate to the satisfaction of the Engineer that the pre-stressing steel is free and unbonded in the duct.

Except as herein provided, cast-in-place concrete shall not be pre-stressed until at least 10 days after the last concrete has been placed in the member to be pre-stressed and until the compressive strength of said last placed concrete has reached the strength specified for the concrete at the time of stressing.

The tensioning process shall be so conducted that tension being applied and the elongation of the pre-stressing steel may be measured at all times. A record shall be kept of gage pressure and elongations at all times and shall be submitted to the Engineer for approval.

Pre-stressing tendons in continuous post-tensioned members shall be tensioned by jacking at each end of the tendon unless noted otherwise on the plans. Such jacking of both ends need not be done simultaneously.

Slippage of pre-stressing steel after tensioning greater than 1/8 in. (3 mm) of the amount assumed in elongation calculations in any unit will be cause for retensioning the unit before the grout is placed.

For post-tensioning no more than one-half of the pre-stressing force in any girder may be stressed before an equal force is stressed in the adjacent girders. At no time during the stressing operations will more than 1/6 of the total pre-stressing force be applied eccentrically about the centerline of the structure.

Unless otherwise noted, the pre-stressing force shall be distributed with an approximately equal amount in each girder and shall be placed symmetrically about the centerline of the structure. In slabs, the pre-stressing force shall be uniformly distributed across the slab.

F. *Ducts.*

1. *Size.* Ducts for tendons made up of a number of wires, bars, or strands shall have an area of at least twice the net area of the pre-stressing steel.

   Ducts for pre-stressing steel when bars are used shall have a minimum inside diameter 3/8 in. (10 mm) larger than the diameter of the bars to be used.

2. *Placement.* Ducts shall be accurately placed at the locations shown on the plans or approved by the Engineer and securely fastened at close enough intervals to avoid displacement during concreting.

   After installation in the forms, the ends of ducts shall at all times be covered as necessary to prevent the entry of water or debris.

3. *Grout Openings.* All ducts for continuous structures shall be vented over each intermediate support, if shown on the plans. Vents shall be 1/2 in. (12 mm) minimum diameter standard pipe. Connections to ducts shall be as shown on the plans. The vents shall be mortar-tight and taped as necessary to seal the vents. Ends of vents shall be removed 1 in. (25 mm) below the roadway surface after grouting has been completed.

Mechanical shutoff valves capable of withstanding grout pumping pressure shall be installed at all vents and at the inlet and outlet of the ducts.

4. *Forming.* All ducts shall consist of rigid galvanized ferrous metal. Transition couplings connecting said rigid ducts to anchoring devices need not be galvanized.

   Rigid ducts may be fabricated with either welded or interlocked seams. Galvanizing of the welded seam will not be required. Rigid ducts shall have sufficient strength to maintain their correct alignment during placing of concrete. Joints between sections of rigid duct shall be positive metallic connections which do not result in angle changes at the joints. Waterproof tape shall be used at the connections.

G. *Ancorage Devices.* All post-tensioned pre-stressing steel shall be secured at the ends by means of approved permanent type anchoring devices. The maximum deviation from the equivalent anchor set as shown on the plans shall be plus 1/8 in. (3 mm).

   All anchorage devices for post-tensioning shall hold the pre-stressing steel at a load producing a stress of not less than 95 percent of the specified ultimate tensile strength of the pre-stressing steel.

   When headed wires are used, the outside edge of any hole for pre-stressing wire through a stressing washer or through an unthreaded bearing ring or plate shall not be less than 1/4 in. (6 mm) from the root of the thread of the washer or from the edge of the ring or plate.

   The load from the anchoring device shall be distributed to the concrete by means of approved devices that will effectively distribute the load to the concrete. Such approved devices shall conform to the requirements of the AASHTO Standard Specification for Highway Bridges, Division I-Design, Article 9.21, and Division II-Construction, Section 10.

H. *Grout and Mortar Material.*

   1. *Grout, Type "A".* Type A grout shall consist of Portland cement and water, and shall contain an expansion admixture or compound approved by the Engineer.

The 28-day compressive strength of grout cubes shall be at least 4,000 psi (28 MPa) when cured and tested in accordance with AASHTO T-106, except confining cover plates are to be clamped on the molds immediately after filling, and left on the molds for at least 20 hours. The grout shall be suitable for use in filling post tension ducts, rock anchors and other pumping applications.

a. *Portland Cement.* Portland cement shall conform to Section 701. Cement used for grouting should not contain any lumps or other indication of hydration or "pack set".

b. *Water.* The water used in the grout should be potable, clean and free of injurious quantities of substances known to be harmful to Portland cement, aggregate or pre-stressing steel.

c. *Admixtures.* The admixture shall impart the properties of low water content, good flowability, minimum of bleed and expansion properties. The expansion properties of the admixture shall produce a minimum expansion of the grout to 5 percent and a maximum of 10 percent, determined by extension of grout above the mold during cure as measured at the center of the specimen. A separate, unconfined specimen shall be made for this purpose. Its formulation shall contain no chemical in quantities that may have harmful effects on the pre-stressing steel or cement. Admixtures containing chlorides, fluorides, sulphites and nitrates shall not be used.

d. *Mixing of Type A Grout.* Water should be added to the mixer first, followed by Portland cement.

   Mixing of the grout shall be of such duration as to obtain a uniform, thoroughly blended grout, without excessive temperature increase or loss of expansive properties of the admixture, if used. The grout shall be continuously agitated until it is pumped.

   No water may be added to the grout to increase the flowability which has been decreased by delayed use of the grout.

   Proportions of materials shall be based on tests made on the grout before grouting is begun. Water content shall be such that a flow time

not less than eleven seconds is produced, as determined by ASTM C939. The Contractor shall furnish test reports from a commercial laboratory confirming properties of grout made with materials supplied for the project.

2. *Grout, Type "B".* The plans shall specify the class of type B grout as follows:

   a. *Class I, Non-metallic, Non-shrink.* Grout shall be a pre-blended, commercial product with a 28-day compressive strength of not less than 5,800 psi (40 Mpa). The grout shall be a nonmetallic, non-shrink, water mixing compound containing Portland cement, silica sand and/or other agents (water reducers, plasticizers, fillers, etc.). No chlorides, fluorides, sulphites or nitrates will be permitted.

      The grout shall be suitable for use in filling keyways between adjacent pre-cast, pre-stressed voided slabs; pre-cast, pre-stressed box girders and other pre-cast elements.

      Grout shall conform to ASTM C1107 grade B or C and the following. When dried in air at 50% relative humidity for 28 days after standard 28 day moist cure, maximum allowable expansion from beginning of cure shall be 0.3% and shrinkage shall not exceed 0.0%. Test report data verifying conformance must be furnished.

      The manufacturer's recommendations regarding mixing, maximum water content, application, curing temperatures and curing conditions shall be strictly observed.

      Surface preparation shall include sandblasting all areas being grouted.

      The grout material shall be approved prior to use.

   b. *Class II, Metallic, Non-shrink.* Grout shall meet the requirements of type B, Class I, except that metallic aggregates will be permitted.

      Intended uses shall include filling keyways between adjacent, pre-cast, pre-stressed voided slabs; pre-cast, pre-stressed box girders; girder base plates and other pre-cast elements. It shall not be used

for any pumping application or where discoloration would be objectionable. Metallic aggregate grouts shall not be vibrated.

The grout material shall be approved prior to use.

3. *Grout, Type "C".* Type C grout shall be a two-component, 100 percent reactive epoxy system that is volumetrically stable. When properly mixed and blended it will produce a material suitable for use in filling keyways between adjacent pre-cast, voided slabs; pre-cast, pre-stressed box girders; and other pre-cast elements.

   The grout shall have a 5,800 psi (40 Mpa) minimum compressive strength in 24 hours.

   The manufacturer's recommendations as to mixing and blending, aggregate gradation and dryness, application and curing temperatures, shall be strictly observed.

   Surface preparation shall include sandblasting all areas being grouted.

   The grout shall be approved prior to use.

4. *Grout, Type "D".* Type D grout (mortar) shall consist of one part Portland cement and two parts fine concrete sand by volume. The grout shall contain only enough water to permit placing and packing.

   The materials shall meet the requirements of Section 701-Portland Cement, and Section 703 - Aggregates. When approved, the gradation requirements of Subsection 703.02 may be waived to allow a finer-textured grout.

   Surfaces to be grouted shall be cleaned of all loose or foreign material that would prevent a bond between the grout and the base concrete. All areas to be grouted shall be flushed with water and surface dry prior to placing the mixture. Curing shall be by water or other approved method as specified in Subsection 502.03. All defective grout shall be removed and replaced at the Contractor's expense.

I. *Grouting.*

1. *Equipment.* The grouting equipment must be capable of continuous mechanical mixing which will produce a grout free of lumps and undispersed cement and be able to pump the mixed grout in a manner which will comply with all provisions of this recommended practice. Accessory equipment such as scales and liquid measures should be provided to accurately batch all materials. The pump should be able to produce an outlet gage pressure of at least 100 psi (690 kPa) and shall have seals adequate to prevent introduction of oil, air or other foreign substances into the grout, and also to prevent loss of grout or water.

   A pressure gage readable to 22 psi (150 kPa) increments having a full-scale reading of not more than 300 psi (2100 kPa) must be placed at some point in the grout line between the pump outlet and the duct inlet. The system shall be provided with an effective control, either manual or automatic, to limit the build up of excessive pressure.

   The grouting equipment should contain a screen having clear openings of 0.07 in. (2 mm) maximum size to screen the grout prior to its introduction into the grout pump. This screen should be easily accessible for inspection and cleaning.

   The grouting equipment shall utilize gravity feed to the pump inlet.

   The grouting equipment shall be capable of continuously grouting the largest tendon on the project in no more than 20 minutes under normal conditions.

   Standby water flushing equipment shall be provided which, in addition to and separate from the grouting equipment, utilizes a different power source than the grouting equipment, has sufficient capacity to flush out any partially grouted enclosures, if necessary, due to blockage, breakdown of grouting equipment or inability to maintain one-way grout flow and is capable of developing a gage pressure of at least 247 psi (1700 kPa).

2. *Preparation of Ducts.* All ducts shall be clean and free of water and deleterious materials that would impair bonding of the grout or interfere with grouting procedures.

All water used for flushing ducts, when required by the Engineer, shall contain either quick lime (calcium oxide) or slaked lime (calcium hydroxide) in the amount of 1.5 lb./gal. (170 g/L). All compressed air used to blow out ducts shall be oil free.

3. *Injection of the Grout.* The entire void space between the duct and the tendon shall be filled with grout.

   The grout should be pumped through the ducts by pumping continuously from one end of the duct. When pumping starts, all valves shall be open. The valve at the first vent should be closed first after a continuous stream of grout emerges. The remaining vents should be closed in sequence, in the same manner.

   Grout shall be pumped through the duct and continuously wasted at the outlet until no visible slugs or other evidence of water or air are ejected and the efflux time of ejected grout is not less than 11 seconds. The outlet pipe shall then be closed and the pumping pressure held momentarily. The valve at the inlet shall then be closed while maintaining this pressure. Valves shall not be removed or opened until the grout has set.

4. *Cold Weather.* Ducts should be kept free of water to avoid damage due to freezing.

   Concrete Temperature - At the time of grouting, the temperature of the concrete should be 45°F (7°C) or higher and maintained at this temperature until job cured 4 in. (100 mm) cubes reach a minimum compressive strength of 800 psi (5500 kPa).

   Grout Temperature - Grout should not be above 90°F (32°C) during mixing or pumping.

J. *Transportation and Storage.* Pre-cast pre-stressed stringers shall be transported in an upright position, and points of support and directions of the reactions with respect to the stringer shall be approximately the same during transportation and storage as when the stringer is in its final position.

K. *Camber.* The Contractor shall check and record the vertical deflection (camber) of each girder. The girder camber is the measured variation between the girder

center elevation and a straight line between the girder end elevations. The camber shall be checked and recorded within 72 hours after transfer of the pre-stressing force, and within a two-week period prior to shipment, but no less than three days prior to shipment.

The Contractor shall perform and record each camber check at a time when the alignment of the girder is not influenced by temporary differences in surface temperature. The actual camber measured shall be compared with the required camber values in the contract documents and the permissible tolerances.

The following are the allowable tolerances from the design camber:

± 1/2 in. (12 mm) maximum up to 80 ft. (24 m) in length
± 1 in. (25 mm) maximum over 80 ft. (24 m) in length

Girders shall meet the required camber values in the contract documents within the allowable tolerances, when erected.

Girders not meeting these minimum requirements are subject to rejection in accordance with Subsection 105.03.

The Contractor shall make provisions to control the camber growth. The Contractor shall control the vertical deflection of pre-stressed concrete girders by scheduling fabrication or other means. The method used by the Contractor to control the vertical deflection shall not cause damage to the girders or any over stress when checked in accordance with the AASHTO specifications. The method of controlling the vertical deflection shall be shown on the shop drawings.

Data from any intermittent camber checks that the Contractor performs shall be made available to the Engineer upon request.

The recorded measurements of the girder camber shall accompany the girder to the construction site as documentation that the girder conforms to the specifications.

All costs in connection with controlling the girder deflection shall be borne by the Contractor.

506.04 Method of Measurement. Pre-stressing of cast-in-place concrete will be measured on the lump sum basis to include furnishing all labor, materials, tools,

equipment and incidentals, and for doing all work involved in furnishing, placing and tensioning the pre-stressing steel in cast-in-place concrete structure, complete in place as shown on the plans, as specified in the specifications and Special Provisions, and as directed by the Engineer.

Full compensation for furnishing and placing additional deformed bar reinforcing steel required by the particular system used, ducts, anchoring devices, distribution plates or assemblies and incidental parts; for furnishing samples for testing and working drawings; and for pressure grouting ducts shall be considered as included in the contract lump sum price paid for pre-stressing cast-in-place concrete or in the contract price for furnishing pre-cast members, and no additional compensation will be allowed.

506.05 Basis of Payment. When no bid items for pre-stressing pre-cast concrete have been provided in the proposal, all costs of pre-stressing concrete members shall be considered as included in the concrete unit price paid for furnishing pre-cast members as provided for in Section 502 - Concrete. Payment for pre-stressing cast-in-place concrete shall be full compensation for all labor, materials, tools, equipment and incidentals for doing all work involved in furnishing, placing, and tensioning the pre-stressing steel in cast-in-place concrete.

Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Pre-stressing Cast-in-Place Concrete	(LS)

SECTION 507 - BEARING PADS AND PLATES

507.01 Description. This work shall consist of furnishing and placing bearing pads and plates in accordance with the specifications and in reasonably close conformity with the plans.

507.02 Materials. Bearing pads and plates shall meet the requirements of the following Subsections of Section 700-Materials:

Self-Lubricating Bronze Bearing Plates	708.29
Neoprene Bearing Pads	711.02
Polytetrafluoroethylene (TFE/PTFE) Bridge Bearing Pads	711.03

507.03 Construction Requirements. The bearing material shall be placed perpendicular to the longitudinal axis of the beam and the sides shall be flush with the outside edges of the stringer.

The concrete surfaces in contact with the bearing pad or plate shall be level transversely with stringer and shall be uniform and smooth. There shall be no coarse aggregate projecting above the surface of the beam seat. The bearing units shall be placed so that uniform bearing is obtained over the full surface of the plate or pad.

507.04 Method of Measurement. Not Specified.

507.05 Basis of Payment. Furnishing the material and doing the work described under this item will not be paid for separately, but shall be considered as subsidiary work, and the cost thereof shall be considered incidental to the cost of other items.

SECTION 508 - CORRUGATED PLATE PIPE

508.01 Description. This work shall consist of constructing corrugated plate pipe in accordance with these specifications and in reasonably close conformity with the lines and grades shown or as directed.

508.02 Materials. The material for corrugated plate pipe shall conform to Subsection 708.20.

508.03 Construction Requirements.

A. *General.* Each plate shall be curved to the proper radius, and the bolt holes shall be so punched that all except end plates shall be interchangeable in the erection process.

   Unless otherwise specified, bolt holes along those edges of the plates that will form longitudinal seams in the finished structure shall be staggered in rows 2 in. (50 mm) apart, with one row in the valley and one in the crest of the corrugations. Bolt holes along those edges of the plates that will form circumferential seams in the finished structure shall provide for a bolt spacing of not more than 1 ft. (300 mm).

The minimum distance from center of holes to the edge of the plate shall be 1.75 times the diameter of the bolt. The diameter of the bolt holes shall not exceed the diameter of the bolt by more than 1/8 in. (3 mm).

When the completed structure is to be a full circle pipe, the plates shall be so curved that when bolted together, true circles of the required diameter shall be formed. When the completed structure is to be a multi-centered pipe or arch, the plates shall be curved to the radii shown.

Plates for forming skewed or sloped ends shall be cut to give the angle of skew or slope specified. Burnt edges shall be free from oxide or burrs, and shall present a workmanlike finish.

B. *Assembly.* The pipe shall be assembled according to the manufacturer's instructions. The unsupported edges of plates shall be held in position by temporary props. Each row of side plates shall extend far enough to support the plate above until the first complete ring has been assembled. A sufficient number of bolts shall be installed to hold the plates in position. Bolts shall not be tightened until the entire structure has been erected. After all the plates are in place, the remaining bolts shall be inserted and all bolts tightened. Unless otherwise provided, Division 2, Article 11.5.6 of AASHTO Standard Specifications for Highway Bridges shall not apply. Care shall be exercised in the use of drift pins or pry bars to prevent chipping or injury to the galvanized coating.

C. *Backfill.* Backfill material shall be deposited evenly on both sides of the pipe as shown on the plans, to a depth of 2 ft. (600 mm) over the top of the pipe, after which the remainder of the fill may be made from one direction, under the supervision of the Engineer.

508.04 Method of Measurement. Corrugated plate pipe will be measured by the foot (meter) complete in place. When the ends of a corrugated plate structure are cut on a skew or slope, the length of the structure will be the bottom length measured along the centerline of the structure and the grade of the structure.

508.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
____ Corrugated Plate Pipe Culvert ___ Thickness	ft. (m)
____ x ____ Corrugated Plate Pipe Arch ___Thickness	ft. (m)
____ x ____ Corrugated Plate Arch ___ Thickness	ft. (m)

SECTION 510 – CONCRETE OVERLAY

510.01 Description. This work shall consist of furnishing and placing a concrete overlay as shown on plans. This overlay shall be either latex modified concrete or concrete with silica fume. The overlay depth shall be as shown on the plans.

510.02 Materials. Materials shall meet the requirements of the following Subsections of Section 700 - Materials.

Aggregate	703
Portland Cement	701
Water for Concrete	711.01
Air-Entraining Admixtures	709.03
Water-reducing Admixtures	709.05

A. *Certification.* The Contractor shall furnish certification of the silica fume/latex modifier stating the results of tests made on samples of the material taken during production or transfer and indicating that applicable requirements of this specification have been met by all material used on the project. Certification and test reports must be furnished to the State prior to use of the material. Test reports indicating typical values must be submitted at the time of the mix design review.

B. *Sampling and Testing*. The Department will sample the material proposed for use on this project. Department testing will be at the option of the Materials Engineer or upon request of the Resident Engineer. Testing of concrete shall be in accordance with Subsection 502.02.

C. *Acceptance*. Portland Cement, Latex Modifier, or silica fume which fail to conform to the requirements of this specification will be rejected. Rejection will be reported to the Contractor promptly and in writing. In case of dissatisfaction with the results of the tests, the Contractor will be allowed additional sampling and retesting.

Acceptance of the concrete overlay is based on conformance with all parameters specified. Acceptance of strength will be determined from the results of 28-day compressive strength tests performed in conformance with Subsection 502.02 on cylinders made from samples of the concrete being placed. Average strength from three companion cylinders will be considered as one test.

Should the 28-day strength for any test fall below the specified minimum strength, the concrete represented by the test shall be subject to rejection, or price adjustment if allowed to remain. A determination concerning acceptance of such low strength concrete shall be based on an evaluation of the necessary durability requirements of the concrete overlay.

Concrete which fails to meet the specified minimum strength may be accepted at a reduced price provided the strength is not more than 10 percent below the specified minimum strength. Concrete represented by tests falling more than 10 percent below the specified minimum strength shall be rejected. Rejected concrete shall be removed at the Contractor's expense.

The price adjustment for the concrete overlay which fails to meet the specified strength, but is allowed to remain in place, shall be in accordance with the following table:

Percent of Specified Strength	**Pay Factor**
95 and above	0.90
90-94	0.80

The quantity of acceptable concrete overlay will be paid for at the contract unit price multiplied by the pay factor as determined above.

D. *Storage.* The material shall be stored in such a manner as to permit easy access for proper inspection and identification of each shipment. Access to every facility shall be provided the Department for careful sampling and inspection, either at the source or at the site of the work. Material shall be protected from freezing and from prolonged exposure to temperatures in excess of 75°F (24°C). Containers stored at the bridge site shall be covered completely with suitable insulating blanket material to avoid excessive temperatures.

E. *Packaging.* When material is delivered, the name and brand of the manufacturer, and the weight of the material contained therein shall be plainly marked on each container. Shipments will be identified by source and lot number. Only one manufacturing source shall be acceptable on a project. Similar information shall be provided on the shipping invoices accompanying the shipment of the material. All containers shall be in good condition at the time of inspection.

Latex Modified Concrete:

Coarse aggregate for latex modified concrete shall be size No. 1.

The latex modifier shall contain a minimum of 46 percent solids. The percent solids will be determined by tests using Idaho T-121. The Contractor shall furnish certification from the producer that the material furnished is identical to that furnished the FHWA Fairbanks Highway Research Station.

The latex modified concrete shall have the following properties:

Mix Design Item	**Requirement**
Cement content	660 lb./ CY (390 kg/m^3)
Latex emulsion admixture	25 gal./ CY (121 L/ m^3)
Approx. added water*, including free moisture in the FA & CA	150 lb./ CY (85 kg/m^3)
Air content, percent of plastic mix	0-6.5
Slump**	4 - 6 in. (100 - 150 mm)
Percent fine aggregate as percent of total aggregate by weight (rounded CA)	55± 5
Percent fine aggregate as percent of total aggregate by weight (crushed CA)	60 ± 5
Weight ratio of Cement-FA-CA- (Rounded CA) ***	1:2.5:2.0 dry basis
Weight ratio of Cement-FA-CA- (Crushed CA) ***	1:2.7:1.8 dry basis
Twenty-eight Day compressive strength (Min.)	4000 psi (27.5 MPa)

NOTES:

* This is in addition to the latex. The water added shall be adjusted to control the slump and should produce net water-cement ratios of 0.35-0.40 by weight.

** The slump shall be measured 4-5 minutes after discharge from the mixer or immediately ahead of the finisher.

*** The dry-weight ratios are approximate and should produce good workability, but due to gradation changes, may be adjusted within limits by the Engineer. The FA ratio may be increased by as much as 0.2 if the CA is reduced by an equivalent amount.

Silica Fume Concrete:

Definitions.

1. Pozzolans - Siliceous or siliceous and aluminous materials which in themselves possess little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

2. Silica Fume - Amorphous silica of high silica content generated as a by product of the reduction of high purity quartz with other ingredients in an electric arc furnace. Trace elements including coal, wood chips, and selected metals or metal ores may or may not be included in the reaction mixture depending on operating conditions. These particles are extremely fine and consist of spheroidal siliceous matter removed from outgoing gases by bag filters in silicon metal producing plants. The gaseous Si0, produced during the reduction of quartz, oxidizes on contact with air and condenses to very small spheres consisting essentially of non-crystalline silica. This product is also referred to as microsilica.

The silica fume concrete shall have the following properties:

Mix Design Item	**Requirement**
Cement Content, Type II,(Minimum)	660 lb./ CY (390 kg/m^3)
Water/(Cement + Silica Fume) Ratio,(Maximum)	0.40
Course Aggregates	Size No. 1
Slump-millimeters	5 in. (127mm) plus or minus 2 in. (50 mm)
Air Content	6% plus or minus 2%
High Range Water Reducers	ASTM C494
*Seven-Day Compressive Strength (Minimum)	4,500 psi. (31 MPa)
*Twenty-eight-Day Compressive Strength (Min)	7,000 psi. (48 MPa)
Percent Silica Fume by Weight of Cement	7.5%

Provide the silica fume admixture as slurry containing microsilica, water, and a high range water reducer, or as densified powder. The silica fume portion shall

meet AASHTO M 307 with a maximum Available Alkali of 1.5%, and have not more than 10% retained when wet-sieved on the No. 325 screen.

510.03 Construction Requirements.

A. *General.* The Contractor and a technical representative from the silica fume/latex modified concrete supplier shall meet with the Engineer for a pre-placement conference at a time mutually agreed upon. At this conference, the Contractor shall present his mix design and methods of accomplishing all phases of the concrete overlay work. The State shall have 15 days to review the mix design.

The Contractor shall have present during the proportioning, mixing, placing, and finishing of the concrete overlay, the services of a technical representative of the latex admixture manufacturer/silica fume supplier and high range water reducer. One person may perform both of these functions. This technical representative shall have expertise in the proper installation of the materials and shall be available to the Engineer for consultation. The Contractor, at no expense to the State, shall adhere to recommendations made by the technical representative and approved by the Engineer. No separate payment will be made for the services of these technical representatives.

Prior to placement, the Contractor shall prepare, place, and cure a trial batch of at least 3 CY (2 m^3) to verify the mix design, demonstrate ability to perform curing operations, and check quality control. Additional trial batches shall be made as necessary to verify changes in design or procedure. Trial batches to verify quality control or design shall be at no additional cost to the Department.

Rails shall be furnished for the finishing machine to travel on. They shall be sufficiently rigid so they do not deflect under the weight of the machine. They shall be so attached to the surface that they may be removed without damage to the edge of the new overlayment. The rails shall be vertically adjustable (not shimmed) and shall be adjusted using a level and level rod to assure proper depth and matching of joints.

The Contractor shall be responsible for setting screed control to obtain the nominal overlay thickness specified as well as finished surface smoothness requirements. The thickness shall be verified prior to the placement of the concrete by attaching a filler block to the bottom of the screed. With the screed

guides in place, the finishing machine shall be passed over the surface to be overlaid. After the overlay thickness has been verified, the profile grade shall be adjusted as directed or approved by the Engineer. Changes in the finish machine elevation controls will not be allowed.

B. *Equipment.* An approved finishing machine complying with the following requirements shall be used for finishing all large areas of work.

A self-propelled finishing machine shall be required for placing, striking off and finishing the bridge deck surface. The machine shall have provisions for raising all screeds to clear the surface. At least two, hand operated, spud type internal vibrators shall be available at all times for use as directed. Request for approval of the specific equipment to be used shall be submitted to the Engineer at least 15 days prior to the start of work.

The machine shall be equipped with vibrating screeds designed to consolidate the modified composition. Vibration frequency shall be variable with positive control between 3,000 and 11,000 vpm. The bottom face of the screeds shall be not less than 4 in. (100 mm) wide and be metal covered. The screeds shall be provided with positive control of the vertical position.

The preceding paragraph will be waived if a Gomaco C450 or equivalent finishing machine with one or more rollers, augers, and 1,500 or 2,500 vpm vibratory pans is used. Any modifications to the Gomaco C450 or equivalent shall be subject to approval.

C. *Deck Preparation.* Removal of the concrete deck surface in accordance with Section 632 is required prior to placing the concrete overlays. Bridge drains shall be temporarily plugged by an approved means during preparation and placement to prevent waste materials from entering drainage systems. Expansion joints and barrier curbs shall be protected by approved means from damage due to construction operations.

Not more than 24 hours prior to placing the overlay, all surfaces to which the overlay is to bond, including exposed reinforcing and structural steel, the work face of the previously placed material, and the faces of curbs and barriers up to a height of at least 1 in. (25 mm) above the proposed overlay surface, shall be cleaned by abrasive blasting or an approved method of waterblasting with 6,961 psi. (48 MPa) minimum pressure. The deck shall then be blown with

compressed air to remove excess water and debris. After the deck has been airblasted, it shall be covered with unused 4 mil. (0.102 mm) plastic sheeting. Steel surfaces shall be cleaned to meet the requirements of Subsection 708.01. Concrete surfaces shall be made free of spalls, laitance, and all contaminants detrimental to achieving adequate bond. Water and oil traps must be provided on the compressors. After the surface is properly prepared, no vehicular traffic, other than equipment required to place the overlay, shall be allowed on the prepared surface. No construction load shall be permitted which exceeds either a 8,000 lb. (3650 kg) wheel load or a 16,000 lb. (7300 kg) axle load. Any combination of axles placed closer than 4 ft. (1.2 m) center-to-center shall be considered as one axle.

All equipment required on the deck for placing the overlay shall either operate on plastic sheeting or be diapered in such a way as to preclude dripping fluids from contaminating the prepared surface.

D. *Mixing.* Latex Modified Concrete:

Continuous-mixing type mixers complying with the following requirements shall be used.

1. The mixer shall carry sufficient cement, fine aggregate, coarse aggregate, latex modifier and water to produce on the site not less than 6 CY (5 m^3) of concrete.

2. The mixer shall be capable of positive measurement of cement being introduced into the mix. A recording meter visible at all times and equipped with a ticket printout shall indicate the quantity accurately.

3. The mixer shall provide positive control of the flow of water and latex emulsion into the mixing chamber. Water flow shall be indicated by flow meter and be readily adjustable to provide for minor variations in aggregate moisture.

4. The mixer shall be calibrated to automatically proportion and blend all components of indicated composition on a continuous or intermittent basis as required by the finishing operation, and shall discharge mixed material directly in front of the finishing machine.

5. A minimum of two mixers will be required for each placement when the total volume of concrete to be placed exceeds the material storage capacity of a single mixer. Additional mixers may be required if conditions require that materials be stockpiled away from the job site. The Contractor shall have sufficient mixers on hand to assure a consistent and uniform delivery and placement of concrete.

6. The mixer shall be equipped with a bypass valve to enable calibration of the water valves or flow meters.

7. The Contractor shall verify the fine aggregate bin vibrators are operating satisfactorily.

Mixers shall be calibrated to accurately proportion the specified mix. Certification of the calibration by an approved testing authority will be accepted as evidence of this accuracy if the yield is shown to be true within a tolerance of 1.0 percent according to the following test.

With the cement meter set on zero and all controls set for the desired mix, activate the mixer, discharging mixed material into a 0.3 CY (0.2 m^3) container. When the container is level-struck full, making provision for settling the material into all corners, the cement meter must show a discharge of 1.8 sacks of cement for latex modified concrete, 7 sacks/CY (9 sacks/m^3).

The concrete as discharged from the mixer shall be uniform in composition and consistency. Mixing capability shall be such that finishing operations can proceed at a steady pace with final finishing completed before the formation of the plastic surface film.

Silica Fume:

Mixers shall be calibrated to accurately proportion the specified mixture. The microsilica manufacturer's technical representative shall advise the Engineer in writing of proper batching sequence, mixing time, mixing speed, and other handling procedures necessary for a uniform, homogeneous mixture meeting the requirements of this specification. Such recommendations shall include procedures relating to the high range water reducer. All such written recommendations shall be followed unless otherwise approved.

The maximum amount of silica fume concrete allowed on a truck mixer is limited to 4 CY (3 m^3).

Unless otherwise approved, when a truck mixer or agitator is used for transporting silica fume concrete, discharge shall be completed within 1 hour and 45 minutes or before the drum has revolved more than 325 revolutions, whichever comes first, after introduction of cement.

When a slurry is used, mix water shall be adjusted to account for the water in the silica fume slurry and the product shall be stored in a tank with an agitator so that the product can be mixed according to the manufacturer's recommendations. If placement is done during cold weather, the tank shall be either insulated or protected against freezing.

E. *Placing and Finishing.* During placement of the overlay, the surface of base concrete shall be in a saturated surface dry condition. This shall be achieved by thoroughly wetting the surface at least 1 hour prior to placement and maintaining it in a moist condition until placement. Acceptable means of maintaining a moist condition are covering with visqueen and/or use of fog spray or soaker hoses, provided that complete moisture coverage is attained. Any standing water in depressions, holes or low areas shall be blown out with compressed air prior to the application of the bonding coat.

A bonding coat consisting of a portion of the overlay mix shall be promptly delivered and deposited on the deck where it shall be scrubbed by brooming onto the wetted, prepared surface. Care shall be exercised to ensure that all vertical and horizontal surfaces received a thorough, even coating. The rate of progress shall be limited to no more than 6 ft. (2 m) ahead of the screed so the brushed material does not become dry before it is covered with the finish course. Materials intended for brushing which have started initial set, dried, or show evidence of loss of paste from the sand shall be disposed of. Coarse aggregate remaining after the brushing operation shall be disposed of.

The material shall be manipulated and struck off to approximately 1/4 in. (6 mm) above final grade. It shall then be consolidated and finished at final grade with the vibrating screeds.

Hand-finishing with a wood float will be required along the edge of the pour or on small areas of repair. In areas requiring hand finishing and areas adjacent to curbs and joint bulkheads, vibrators will be used to ensure proper consolidation.

A construction dam or bulkhead shall be installed in case of major delay in the placement operation. During minor delays of one hour or less, the end of the placement may be protected from drying with several layers of wet burlap.

Longitudinal joints shall be at or within 1 ft. (300 mm) of lane lines. When concrete is to be placed against concrete in a previously placed lane or strip, the previously placed concrete shall be sawed back the necessary distance to provide a straight and vertical edge. The sawing of the joint may be omitted if bulkhead produces a straight, smooth, vertical surface. It shall be sandblasted, cleaned, and given the bonding coat before new concrete is placed. Concrete shall not be placed against the edge of an adjacent lane or strip that is less than 24 hours old.

Adequate precautions shall be taken to protect freshly placed material from sudden or unexpected rain. The Engineer may order removal of any material damaged by rainfall.

The concrete overlay shall not be placed when the evaporation rate is greater than 0.15 lb./SF (0.73 kg/m^2) per hour when tested in accordance with Idaho T-133, unless the Contractor can demonstrate by reducing the spread width or by other means that a satisfactory surface finish can be obtained. The concrete overlay shall not be placed at ambient temperatures lower than 45°F (7°C) or higher than 75°F (24°C).

When a tight uniform surface has been achieved, the surface of the concrete shall be textured perpendicular to the longitudinal centerline of the structure with an approved grooving tool. Nominal groove width shall be 1/8 in. (3 mm), with spacing of 1/2 in. to 3/4 in. (12 mm to 20 mm). Depth of tined grooves is intended to be 1/8 in. to 3/16 in. (3 mm to 5 mm). Check groove depth according to the “Procedure” portion of AASHTO T 261. If more than three (3) readings in a set of ten (10) are outside the intended depth range, make adjustments to the tining operation. An approved wire tine texture may be applied providing it leaves a finish comparable to the groove depth and spacing specified above, and causes only minimal surface tearing or aggregate removal. The surface adjacent to the curb shall be finished to a smooth-troweled texture approximately 1 ft. (300 mm) from the face of the curb.

F. *Curing.*

The surface shall be promptly covered with a single layer of clean, wet burlap. Care shall be exercised so the burlap is not dragged or dropped on the fresh surface. Ensure that the burlap is drained of all free water and that it is placed as soon as the surface will support the covering without deformation. Do not wait until the surface will support foot traffic. The concrete overlay forms a plastic film at the surface upon drying, usually within 20 minutes in hot, dry weather. This film must be protected from over-drying and cracking by prompt covering with the wet burlap. The burlap shall be maintained in a wet condition throughout the duration of the wet cure. The deck drains shall be unplugged to allow drainage to pass through.

Within one-half hour of covering with wet burlap, a layer of 4 mil. (0.102 mm) polyethylene film shall be placed on the wet burlap for the required wet-cure period. Approved burlap-polyethylene sheets may be substituted for the polyethylene film. This material shall not replace the initial wet burlap.

Latex modified concrete shall have a 48-hour wet curing period. The curing material shall then be removed for an additional 72-hour dry cure period. The dry curing period shall be extended in case of rainfall or dampness to assure that the surface of the concrete has a total of 72 hours of dry curing.

Silica fume concrete shall have 4-day wet curing period.

A work bridge shall be used to place the burlap and polyethylene. Walking on the overlay shall be avoided during placement of these items.

No traffic shall be permitted on the silica fume concrete surface until the 4 day wet cure is complete and the silica fume has a minimum compressive strength of 4,500 psi. (31 MPa). No traffic shall be permitted on the latex concrete surface until completion of the dry-cure period. The Engineer may require a longer curing period at temperatures below 55°F (13°C).

Upon completion of the wet cure of the last section overlaid, all visible cracking shall be immediately treated with a two component modified methacrylate penetrating sealer. Sand shall be spread over areas on surface where sealer has puddled in an amount to ensure adequate skid resistance. Two acceptable sealers are SikaPronto 19 and Transpo Sealate T70-X.

The finished concrete overlay surface shall meet the smoothness requirements as described in Section 409.

After the concrete overlay has cured, a chain drag or other appropriate tool or device shall be used by the Engineer to determine if any delaminations exist between the new overlay and the mating concrete surface. All delaminated areas shall be removed and replaced. Vertical edges and rectangular-shaped patching will be required when removal is necessary.

510.04 Method of Measurement. The concrete overlay shall be measured by the CY (m^3) as recorded on approved batch tickets. Batch tickets shall be corrected for unacceptable material or excessive waste quantities.

510.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Concrete Overlay	CY (m^3)

Should the volume used exceed the "neat line" volume by more than 10 percent, the volume exceeding 10 percent of the neat line volume will be paid for at 50 percent of the contract unit price.

Concrete overlay that fails to meet the specified minimum strength, but which is allowed to stay in place, shall be subject to an adjustment in price in conformance with Subsection 510.02. The price adjustment shall be deducted from the unit price of the concrete overlay and shall apply to the quantity of concrete overlay represented by the individual strength test.

SECTION 511 – CONCRETE WATERPROOFING SYSTEMS

511.01 Description. This work shall consist of furnishing all labor, materials, equipment including incidentals to apply a waterproof system to the top surface of buried reinforced concrete slabs, bridge decks, or other designated surfaces as required by the plans and specifications. The system may be a hot-applied elastomeric liquid asphalt sealant, a fabric membrane sheet system, a penetrating water repellent, or precoated preformed membrane sheet system.

511.02 Materials. Materials shall meet the following requirements:

Liquid Asphalt Sealant	Type A System	ASTM D 3406
Asphalt Roll Roofing	Type A System	ASTM D 224 Type II
Primer for Liquid Membrane System	Type A System	702.03
Asphalt Cement	Type B System	702.01
Fabric	Type B System	718.02
Sand	Membrane Protection Blanket	703.02
Precoated Preformed Membrane Sheet	Type D System	Tapecoat M860, Phillips Petrotac, Polyguard nw-75, Or PavePrep GeoTac
Penetrating Water Repellent	Type C System	See Below:

Penetrating water repellent shall be an emulsion; or solution of silane or siloxane or approved generic equivalent. The repellent applied to exposed concrete surfaces shall not stain, discolor, darken the concrete surface, or form a coating on concrete surfaces. The repellent material shall comply with the following minimum testing requirements, for qualification purposes.

1. Maximum Water Absorption

   a. Water immersion ..... ASTM C-642
   b. Duration ..... 48 Hrs.
   c. Maximum Absorption ..... 1.00% by Wt.

2. Percent Reduction of Water Weight Gain
   a. Water immersion/(15%NaCl) ..... NCHRP Rep. #244 Series II
   b. Duration ..... 21 Days
   c. Min. % Reduction of Water Weight Gain versus control 75%

3. Chloride Ion Penetration Test No. 1

   Test No. 1

   a. Chloride Ion Absorbed @ 1 in. (25 mm) Depth NCHRP Rep. #244 Series II

b. Duration .....21 Days
c. Min. % Reduction Based on Untreated 75%

Test No. 2

a. Chloride Ion Absorbed @ 1 in. (25 mm) Depth ....NCHRP Rep #244 Series IV
b. Duration .....24 Weeks
c. Min. % Reduction Based on Untreated 90%

4. Penetration Depth (ITD Test) 5/32 in. (3.8 mm) min.

5. Alberta Transportation and Utilities Waterproofing Tests

a. Waterproofing before sandblast.....82.5% min.
b. Waterproofing after sandblast .....75.0% min.

Tests 2, 3, and 5 will be performed by an independent testing laboratory at no cost to the State. Certified laboratory reports for 2, 3, & 5 are to be furnished to the Engineer at least 30 days prior to intended application of the product. A certification statement shall be submitted attesting that the sealer furnished to the project has same formulation as the material represented by laboratory reports.

Tests 1 and 4 will be the responsibility of the state, and either or both may be waived based on previous testing or product acceptance by other states.

Project samples may be taken to verify the certification.

511.03 Construction Requirements.

A. *Surface Preparation.* For new construction, the concrete surface shall be clean, dry, fully cured and finished as required in Subsection 502.03, Part (I)3. New concrete surfaces where penetrating water repellent is to be applied shall be sandblasted. As an alternative, the surface may be cleaned with a hydroblast unit using water with a minimum nozzle pressure of 7,000 psi (48 MPa).

For rehabilitation of a structure, the concrete surface to receive the membrane application shall be free of all foreign materials, all sharp concrete edges shall be corrected in a manner satisfactory to the Engineer, and all repairs and

patches shall be fully cured. The entire surface and the sides of curbs for a height of 1 in. (25 mm) above the thickness of the overlay shall be sandblasted prior to application of the membrane.

B. *System Types.*

General System Types are:

Type A, Liquid Membrane consists of an emulsified asphalt prime coat covered with a hot-applied membrane layer and a layer of asphalt roll roofing.

Type B, Fabric membrane consists of a prime coat with a layer of fabric embedded into it.

Type C, Penetrating Water Repellent consists of a sealant which penetrates the deck surface and forms a water repellent layer within the concrete.

Type D, Pre-coated Pre-formed Membrane consists of prefabricated sheets which may be self-adhesive or may require a separate bonding agent.

Type-A Application of Liquid Membrane System. Emulsified asphalt prime coat shall be evenly applied to the concrete at a rate of 0.06 gal./SY (0.25 L/m^2). Acuring period from one to three hours, depending on air temperatures, shall be required before applying the elastomeric liquid asphalt membrane.

Concrete surface shall be thoroughly dry prior to application of the membrane. Hot membrane material shall be applied to the prepared surfaces at a uniform rate to yield a minimum of 0.1 in. (2.5 mm) thickness (approximately 0.5 gal./SY (2.25 L/m^2). Application temperature, equipment, and procedures recommended by the membrane manufacturer shall be strictly adhered to. Membrane application at curbs shall extend to a height 1 in. (25 mm) above the thickness of the overlay; splattering of membrane or discoloration of the curbing above this point will not be permitted.

Small pinholes in the cooled membrane are not considered detrimental. No vehicles will be allowed on the bare membrane.

Following application and curing of the membrane, the entire treated surface shall be covered with asphalt roll roofing. Roofing shall be laid parallel to the centerline

of bridges, unless otherwise approved. Roofing joints shall be butted or overlapped, with a maximum gap of 3/8 in. (10 mm) or a maximum lap of 4 in. (100 mm). A suitable mastic or cement shall be used at all lap joints and as needed to tack the roofing to the membrane surface. The entire roofing application shall be essentially free of wrinkles, bubbles or other placement defects. Defects rising over 1/2 in. (12 mm) above the surface shall be slit and either removed or lapped and cemented together. The roofing shall be bonded to curbs by applying a bead of the hot membrane the full length of the curb at the edge of the roofing.

Type-B Application of Fabric Membrane Sheet System. Primer shall be uniformly applied over all surfaces receiving the fabric. The primer type, rate of application, concrete moisture, and drying time shall be in accordance with the fabric manufacturer's recommendations. If an asphalt cement prime coat is used, it shall be the same type and grade as used in the plant mix overlay and applied at a rate of 0.22 gal./SY (1.0 L/m^2). Concrete surface shall be thoroughly dry prior to application of asphalt cement prime coat.

Fabric may be applied by hand from a spindle or a truck-mounted reel. Fabric shall be applied in straight longitudinal lays beginning from curbs and progressing to the roadway centerline. The fabric shall be applied against curb and joint faces to a height 1/2 in. (12 mm) above the plant mix overlay and shall consist of a continuous sheet when possible.

Lap slices shall be a minimum of 3 in. (75 mm). Any irregularity or defect rising over 1/2 in. (12 mm) above the surface or covering more than 1 SF (0.1 m^2) of area shall be slit, flattened, and patched with a strip of membrane material not less than 2 in. (50 mm) wide.

Type-C Application of Penetrating Water Repellent System. The penetrating, water repellent material shall be uniformly applied over all surfaces to receive this treatment. The penetrating, water repellent compound shall be applied on a completely cleaned and sandblasted surface. Concrete moisture shall be as recommended by the manufacturer of the water repellent material.

The repellent is to be spray applied using equipment and application pressure recommended by the manufacturer. Bridge deck and horizontal surfaces shall be treated using a spray bar system approved by the manufacturer.

The sealing penetrant shall be applied and used in accordance with the manufacturer's recommendation, except the material shall not be applied when ambient or surface temperature is below 40°F (4°C) nor above 100°F (38°C), nor when wind exceeds 15 mph (25 km/h). On surfaces which will be exposed to foot or vehicle traffic, application rate shall not be lighter than that used to pass the Alberta sandblast test. On other surfaces, the manufacturer's normal recommended application rate may be used.

Type-D Application of Pre-coated Pre-formed Membrane Sheet System. The work shall consist of applying pre-coated pre-formed membrane sheets to the surface receiving the membrane.

Application, surface preparation and primer (if required) shall be in accordance with manufacturer's recommendations.

All joints between sheets of the membrane shall be lapped a minimum of 2 in. (50 mm). The membrane sheet system shall be free of wrinkles.

C. *Protection and Overlaying.* Only rubber-tired vehicles necessary for construction of overlays will be allowed on the completed membrane system. No public traffic will be allowed. During overlay work, a thin dusting coat of Portland cement may be placed by hand to prevent paver or truck tires from sticking to the membrane.

If a base aggregate or borrow course is to be placed on the waterproof membrane, a 1.2 in. (30 mm) layer of sand shall be uniformly placed over the membrane surface.

Plant mix overlays shall be constructed as soon as practicable after completion of the membrane and in accordance with Section 405, except that the minimum plant mix temperature when compaction begins shall be 234°F (112°C). Rolling shall be with steel wheel rollers with no vibration. Special compactors or rollers may be required to achieve adequate compaction adjacent to curbs, deck drains, etc.

D. *Acceptance Testing.* After completion of the plant mix overlay, the waterproofing effectiveness of the membrane-pavement system shall be determined at the option of the Engineer. The minimum electrical resistance shall be 500 000 ohms when tested in accordance with ASTM D3633. Areas determined by the

Engineer as having a resistance less than 500 000 ohms shall be repaired at the Contractor's expense. If more than 30 percent of the surface area is determined to be defective, the Engineer may require the repair to consist of removal and replacement of the entire pavement overlay and membrane.

The electrical resistance test ASTM D3633 will not be required on penetrating water repellent systems.

511.04 Method of Measurement. The concrete waterproof system shall be measured by the square yard (square meter) in place as determined in the plans. The measurement shall include all horizontal and vertical surfaces.

511.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Concrete Waterproof System	SY (m^2)

Materials for the placement of pavement overlays will be measured and paid for under their respective pay items.

SECTION 512 – GABION STRUCTURE

512.01 Description. This item shall consist of constructing a gravity wall of rock filled wire gabions in accordance with these specifications. The plans will identify Gabion Structure as a Concept Design or a Plan Detailed Design.

A. *Concept Design*. The Contractor shall provide a detailed design based on the information provided in the concept design. The design shall be in accordance with Section 5, Division 1 of the latest version of the AASHTO Standard Specifications for Highway Bridges and shall be stamped and signed by a Professional Engineer registered in the State of Idaho. Gabion Structure shall be constructed in reasonably close conformity with the lines and grades as shown on the detailed design or as directed.

B. *Plan Detailed Design*. Gabion Structure shall be constructed in reasonably close conformity with the lines and grades as shown on the plans or as directed.

512.02 Materials. All gabion materials shall comply with the requirements of Section 715.

512.03 Construction Requirements.

A. *Preparation of Foundation*. The foundation for gabion structures shall be excavated to the lines and grades shown on the plan or as directed by the Engineer.

Excavation for the gabion structure footing shall be to the elevation shown on the plans or as directed by the Engineer to fit field conditions. Where soft, yielding material is encountered, the material shall be removed below the foundation grade for a depth of at least 2 ft. (600 mm) or as directed by the Engineer. The width of the excavation shall be at least 6 in. (150 mm) greater than the bottom width of the wall. The excavation below grade shall be backfilled with granular material and compacted in layers not to exceed 6 in. (150 mm) in uncompacted depth to form a uniform foundation. Slipouts caused by the Contractor's operations shall be repaired by the Contractor to the satisfaction of the Engineer at the Contractor's expense.

B. *Gabion Basket Assembly*. Assembly shall consist of rotating the panels into position and joining the vertical edges.

Welded wire mesh panels shall be joined along the vertical edges with spiral binders or lacing ties. When tied, they shall be joined with the tie wire passing through each mesh opening along the joint and secured with a locked loop as shown on the plans. When spiral binders are used, the ends of the spiral binders shall be crimped to secure the spiral in place.

Twisted wire mesh panels shall be joined along the selvedged vertical edges with tie wire or locking wire fasteners. When tied, they shall be joined with tie wire at 4 in. (100 mm) nominal spacing with alternating single and double locked loops as shown on the plans. When lock wire fasteners are used, they shall be applied at each mesh opening.

For either mesh style there shall not be any opening greater than 4.75 in. (120 mm) (maximum line dimension) along the joined edges or at the corners of the gabion baskets.

The wire mesh panel (base, ends, sides, diaphragms, and lid) shall be assembled such that the strength and flexibility at the connections is at least equal to that of a single panel.

C. *Erection of Gabion Structure*. The empty gabion baskets shall be placed on a smooth, firm foundation. Each row, tier, or layer of baskets shall be reasonably straight and shall conform to the line and grade shown on the plans or established by the Engineer. The empty gabion baskets shall be fastened to the adjacent baskets along the top and vertical edges. Each layer shall be fastened to the underlying layer along the front, back and ends. Fastening shall be performed in the same manner as provided for assembling the gabion units.

Unless otherwise indicated on the plans, the vertical joints between basket units of adjacent tiers or layers, along the length of the structure, shall be staggered by at least one cell.

Before filling each gabion with rock, all kinks and folds in the wire mesh shall be removed and all baskets shall be properly aligned. A standard fence stretcher, chain fall or steel rod may be used to stretch the wire baskets and hold alignment.

D. *Filling Gabion Cells*. The gabion cells shall be carefully filled with rock placed by hand and/or machine in such a manner that the alignment of the structure will be maintained and so as to avoid bulges and to minimize voids. All exposed rock surfaces shall have a reasonably smooth and neat appearance. No sharp rock edges shall project through the wire mesh.

The gabion cells in any row or layer shall be filled in stages so that local deformations may be avoided. At no time shall any cell be filled to a depth exceeding 1 ft. (300 mm) more than any adjacent cell.

During filling operations, internal connecting wires shall be placed in the cells in the following manner:

1. Each cell of the 3 ft. (1 m) high baskets shall be filled to one-third its depth, after which connecting wires shall be laced in each direction as shown on the plans. Each end of the connecting wires shall be looped around two mesh openings. This operation shall be repeated when the cell is two-thirds full.

2. For thinner gabion baskets, internal connecting wires are not required except when 18 in. (450 mm) baskets are used vertically, in which case the procedure under (1) above shall be followed.

The layer of rock shall completely fill the gabion basket so that the lid will bear on the rock when it is secured. The lid shall be joined to the sides, ends, and diaphragms in the same manner as specified for joining the vertical edges. The gabion basket lid shall be secured so that no more than 1 in. (25 mm) gap remains at any connection. Gabion rows or layers not completed at the end of each shift shall have the last gabion filled with rock tied internally as an end gabion.

E. *Backfilling the Gabion Structure*. The area behind the gabion structure shall be backfilled with granular material.

Geotextile, if required, shall be spread uniformly over the back of the gabion structure as shown on the plans. Joining edges of the geotextile shall be overlapped a minimum of 1 ft. (300 mm) and shall be anchored in position with approved anchoring devices. The Contractor shall place the backfill material in a manner that will not tear, puncture, or shift the geotextile.

The granular backfill material shall be placed in layers and shall be compacted until a uniform density of not less than 95 percent of the maximum density determined by AASHTO T 99, Method C or D. The maximum thickness before compaction shall not exceed 1 ft. (300 mm). The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

512.04 Method of Measurement. The method of measurement for furnishing and construction of gabion retaining wall, including all labor, materials and any other incidental items required to complete gabion wall structure in accordance with the plans and these specifications, shall be by the cubic yard (cubic meter) complete in place.

Structure excavation, and compacting backfill, will be in accordance with Section 210-Structure Excavation and Compacting Backfill. Geotextile, when used, will be measured and paid for in accordance with Section 640 - Construction Geotextiles.

512.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Gabion Structure	CY (m^3)

SECTION 600 – INCIDENTAL CONSTRUCTION

SECTION 601 - CONDUITS, GENERAL

601.01 Description. This work shall consist of the construction of culverts, siphons, irrigation lines, sewers, underdrains and embankment protectors in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as directed.

601.02 Materials. The plans will show one or more of the several materials and classes of pipe which may be used at each installation, and if gaskets are required.

Extensions of pipe shall be of the same type or class of material as the existing pipe.

Except for specified installations, joints for concrete pipe may be either mortared joints or gasketed joints.

Class II reinforced concrete pipe may be substituted for either type of non-reinforced pipe.

Siphon type metal pipes shall meet the following:

Spot welded and riveted pipe shall be asphalt coated and all seams shall be double welded or close riveted.

Lock seam pipe shall be asphalt coated, unless a gasket is incorporated into the lock seam. Producers of such gasket lock seam pipe shall be qualified under the Washington State DOT Qualification Program for Lockseam Storm Sewer Pipe with Seam Sealant, or equivalent qualification. Documentation of such qualification shall be furnished.

Asphalt coating is not required on continuous welded seam pipe unless otherwise specified in the plans.

601.03 Construction Requirements. Pipe shall be installed in accordance with the detailed requirements under the item for which it is used

601.04 Method of Measurement. Pipe will be measured as provided for in the various items specified. Pipe will be listed by diameter and total length in the bid

schedule. Each diameter category may include one or more types, thicknesses, and/or classes of material.

601.05 Basis of Payment. The contract price shall be based on all the various kinds of pipe included in the item and no adjustment in contract price will be made because of normal minor adjustments in length of individual kinds of pipe.

SECTION 602 - CULVERTS

602.01 Description. This work shall consist of the construction of pipe culverts in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as directed.

602.02 Materials. Materials shall meet the requirements of the following Subsections of Section 700 - Materials.

Concrete Pipe for Irrigation or Drainage 706.03
Reinforced Concrete Pipe.....706.04
Corrugated Metal Pipe 706.06
Gaskets for Concrete Pipe 706.11
Rubber Gaskets for Corrugated Metal Pipe 706.12
Ribbed Polyvinyl Chloride (PVC) Pipe 706.15
Corrugated Polyethelene (PE) Pipe 706.16
Ribbed Polyethelene (PE) Pipe 706.17

602.03 Construction Requirements. The outside laps of circumferential joints shall point upstream and longitudinal laps shall be at the sides of corrugated metal pipe. The lugs on the coupling bands of metal pipe shall be placed to one side of the top of the centerline of the pipe so that they will not extend above the top of the pipe.

Concrete pipe shall be laid beginning at the lower end with the receiving end upstream, with ends fully and closely joined. Joints shall be made by one of the following methods:

1. *Mortared Joints.* Before the succeeding sections of pipe are laid, the lower portion of the receiving end of the preceding pipe shall be cleaned and plastered on the inside with sufficient cement mortar to bring the inner surfaces of the abutting pipes flush and even. After the section is laid the remainder of the joint shall be filled with mortar and sufficient additional mortar shall be used to form

a bead around the joint. The inside of the joint shall then be wiped and finished smooth. Immediately after laying the mortar on, the outside shall be protected from the sun and air with a moist covering for a period of at least 3 days.

Cement mortar shall be composed of 1 part Portland cement and 2 parts approved sand by volume. Mortar that is not used within 30 minutes after mixing with water shall be discarded.

2. *Gasketed Joints.* The bell end of each section of pipe laid shall be lubricated with an approved type of vegetable compound soap or bentonite mixed with water to form a soft paste, or as recommended by the manufacturer. After the bell has been lubricated, care shall be taken to keep the joint free of sand or dirt. The spigot end of the pipe shall be lubricated only after the gasket has been placed on the pipe in contact with the seating shoulder. The spigot end shall then be inserted squarely into the bell and the two sections of pipe pushed together so that the end of the spigot is in full contact with the bell socket shoulder. Care shall be taken to avoid rolling the gasket into position.

Polyvinyl Chloride (PVC) pipe and Polyethelene (PE) pipe shall be installed in accordance with the manufacturers' recommendations. Exposed culvert ends shall be anchored with headwalls or standard metal end sections.

602.04 Method of Measurement. Pipe culverts as ordered or approved will be measured by the foot (meter) complete in place. An additional 1 ft. (0.3 m) length will be allowed for each connecting band used in making an authorized extension of existing corrugated metal pipe. Culvert sections attached to aprons shall be included in the measurement of culverts.

Pipe aprons required solely because of the use of Polyvinyl Chloride (PVC) or Polyethelene (PE) pipe, when other pipe material is acceptable, will neither be measured nor paid for separately, but shall be considered incidental and the cost thereof included in the contract unit price for pipe culvert.

602.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
__ Pipe Culverts	ft. (m)
__ x __ Pipe Arch	ft. (m)

Structural excavation and compacting backfill, including the removal of unsuitable material below the established grade, will be measured and paid for as provided in Section 210.

SECTION 603 - PIPE SIPHONS

603.01 Description. This work shall consist of the construction of pipe siphons in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as directed.

603.02 Materials. Materials shall meet the requirements of the following Subsections of Section 700 - Materials.

Reinforced Concrete Pipe 706.04
Corrugated Metal Pipe 706.06
Gaskets for Concrete Pipe 706.11
Rubber Gaskets for Corrugated Metal Pipe 706.12
Class PS 46 Polyvinyl Chloride (PVC) Pipe 706.14
Ribbed Polyvinyl Chloride (PVC) Pipe 706.15

603.03 Construction Requirements. The installation of metal pipe siphons shall conform to the requirements of Subsection 602.03, and in addition the coupling bands shall be assembled complete with band gaskets as shown on the plans.

The installation of concrete pipe siphons shall conform to the requirements of Subsection 602.03.

The installation of Class PS 46 and Ribbed PVC pipe siphons shall conform to the requirements of Subsection 602.03.

Before backfilling, the Contractor shall completely fill the siphon with water and repair any leaks that develop. Only approved methods of repairing leaks shall be used. Leaks around joints in rubber gasketed concrete pipe will require encasing the joint in an approved reinforced concrete collar. Only two such collar and joint repairs will be permitted for each 150 ft. (45 m) of pipe. Unless otherwise permitted, the siphon shall be emptied of water before making repairs and shall be refilled, retested and approved before backfilling.

603.04 Method of Measurement. Pipe siphons will be measured by the foot (meter) along centerline complete in place. The length may be calculated from the dimensions of the approved siphon layout.

603.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
__ Pipe Siphon	ft. (m)

Structural excavation and compacting backfill, including the removal of unsuitable material below the established grade, will be measured and paid for as provided in Section 210.

SECTION 604 - IRRIGATION PIPE LINES

604.01 Description. This work shall consist of the construction of irrigation pipe lines in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as directed.

604.02 Materials. Materials shall meet the requirements of the following Subsections of Section 700 - Materials.

Concrete Pipe for Irrigation or Drainage	706.03
Reinforced Concrete Pipe	706.04
Corrugated Metal Pipe	706.06
Gaskets for Concrete Pipe	706.11
Rubber Gaskets for Corrugated Metal Pipe	706.12
Class PS 46 Polyvinyl Chloride (PVC) Pipe	706.14
Ribbed Polyvinyl Chloride (PVC) Pipe	706.15

Corrugated Polyethylene (PE) shall meet the requirements of Subsection 706.16 with the following additions:

1. Pipe shall be Type S.
2. The working pressure shall be 10 psi (65 kPa) or less.
3. Couplings and fittings shall conform to ASTM D-3212 and gaskets to ASTM F-477.

604.03 Construction Requirements. Structure excavation and compacting backfill shall meet the requirements of Section 210 - Structure Excavation and

Compacting Backfill, except that compaction requirements are waived for those portions of the line which are not within the roadway prism.

Backfill outside the roadway prism shall be compacted by puddling, tamping or rolling.

Concrete irrigation pipe shall be installed to meet the requirements of Subsection 602.03.

Corrugated metal pipe shall be installed to meet the requirements of Subsection 603.03.

Polyvinyl Chloride (PVC) pipe shall be installed to meet the requirements of Subsection 602.03.

Before the pipe line is accepted, it shall be tested for leaks. This test shall be made by closing off any convenient section with suitable water bulkheads, filling the line with water, applying pressure to the line equal to the maximum static head the finished line will be subjected to at the point of testing. Leaks shall be located and repaired in a satisfactory manner and approved.

604.04 Method of Measurement. Irrigation pipe lines will be measured by the foot (meter) complete in place. An additional 1 ft. (0.3 m) length will be allowed for each connecting band used in making an authorized extension of existing corrugated metal pipe.

604.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
__ Irrigation Pipe	ft. (m)

Structure excavation and compacting backfill will not be measured and paid for, but shall be considered as subsidiary work and the cost thereof included in the contract unit price for irrigation pipe.

SECTION 605 - SEWERS

605.01 Description. This work shall consist of the construction of sewers with manholes, inlets, connections, and other appurtenances to carry drainage water or

sewage in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as directed.

605.02 Materials. Materials shall meet the requirements of the following Subsections of Section 700 - Materials.

Concrete Sewer Pipe 706.02
Concrete Pipe for Irrigation or Drainage 706.03
Reinforced Concrete Pipe.....706.04
Corrugated Metal Pipe 706.06
Gaskets for Concrete Pipe 706.11
Rubber Gaskets for Corrugated Metal Pipe 706.12
ABS Composite Sewer Pipe.....706.13
Class PS 46 Polyvinyl Chloride (PVC) Pipe 706.14
Ribbed Polyvinyl Chloride (PVC) Pipe 706.15
Manhole Covers and Rings, Grates, Catch Basins, Inlets, etc. 708.22

Corrugated Polyethylene (PE) pipe may only be used for storm sewer and shall meet the requirements of Subsection 706.16 with the following additions:

1. Pipe shall be Type S.

2. Pipe line with couplings shall not be subjected to pressure flow.

605.03 Construction Requirements. Tunnel work or jacking may be used to cross under cross walks and house drives, or under service pipes. Structure excavation and compacting backfill shall meet the requirements of Section 210 - Structure Excavation and Compacting Backfill.

Concrete pipe for sanitary sewer lines shall be laid beginning at the lower end with the receiving end upstream, with ends fully joined. Suitable means shall be used to prevent the circulation of air within the pipeline. Rubber gasketed joints shall be used and shall meet the requirements of Subsection 602.03.

Concrete and Polyethylene pipe for storm sewer lines shall be installed to meet the requirements of Subsection 602.03.

Corrugated metal pipe shall be installed to meet the requirements of Subsection 603.03. Polyvinyl Chloride shall be installed to meet the requirements of Subsection

602.03. Spiral rib corrugated steel pipe shall be installed in accordance with the manufacturer's recommendations.

ABS pipe shall be installed in accordance with the manufacturer's recommendations.

Before the sewer line is accepted, the line shall be tested for leaks. This test shall be made by closing off any convenient section with suitable watertight bulkheads, filling the line with water, applying a pressure to the line of 4 ft. (1 m) of head measured from the top of the pipe at the upstream end, and supplying water to the section under test in such a manner that the loss may be measured. The loss of water shall not exceed 200 gal./in. of pipe dia./mi./day (18.5 L/mm of pipe dia./km/day). If the loss is in excess of the amount permitted, the leak or leaks shall be located and corrected.

As an acceptable alternate to hydraulic testing, the testing may be by low-pressure air method in which event the installations shall be tested and found acceptable in conformance to the following:

1. Acceptance testing shall be on runs or sections of the installation. Preliminary testing prior to backfilling will be permitted as a guide to quality of material and workmanship. When tested, pipe may be in a wet condition.

2. The apparatus and method used shall be one or another of those recommended by the pipe manufacturers, subject to approval of the Engineer as to accuracy and adequacy.

3. The installation being tested, between its plugged ends, shall be conditioned for testing by pressurizing it to an internal pressure of 4 psi (27.5 kPa). References to air pressure in these requirements are those which are in excess of any back pressure on the installation, such as would occur if the pipe were submerged in water. This pressure of 4 psi (27.5 kPa) shall be held for not less than 2 minutes and longer as necessary to indicate pressure stabilization.

4. The tested section, when tested on the air pressure drop method, will be acceptable if the time required for the pressure to drop from 3.5 psi to 2.5 psi (24kPa to 17 kPa) conforms with ASTM C-924M (C-924).

   Connections to inlet and outlet structures may be tested by blocking off a section of the pipe outlet, filling the structure with water and observing the drop of water surface. To be acceptable, water loss shall not exceed 0.002 gal/in. (0.01

L/10 mm) inside perimeter of connection per foot (meter) of structure height or length per hour with no outside back pressure.

605.04 Method of Measurement. Sewers will be measured by the foot (meter) in place, excluding the distance across catch basins, manholes, inlets, and other structures where the pipe, or a portion of it, is not actually incorporated in the finished product.

Manholes, catch basins, and inlets will be measured by the number installed complete in place.

605.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
_____ Storm Sewer Pipe	ft. (m)
_____ Sanitary Sewer Pipe	ft. (m)
Manholes, Type __	Each
Catch Basins, Type __	Each
Inlets, Type __	Each
Sediment and Oil Trap Manhole	Each
Sediment Control Catch Basin	Each

Structure excavation and compacting backfill will not be measured and paid for, but shall be considered as subsidiary work and the cost thereof included in the contract unit prices for sewers.

SECTION 606 - PIPE UNDERDRAINS

606.01 Description. This work shall consist of furnishing and placing pipe underdrains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as directed.

606.02 Materials. Materials shall meet the requirements of the following Subsections of Section 700 - Materials.

Metallic Coated Corrugated Steel Underdrains	706.07
Corrugated Aluminum Pipe for Underdrains	706.08
Corrugated Polyethylene Drainage Tubing	706.10
PVC Pipe, Perforated and Unperforated	706.14

606.03 Construction Requirements. Perforated pipe shall be laid with the perforations down, unless otherwise directed. Special backfill shall be carefully placed around and to the elevation over the pipe as directed. Approved backfill material shall be placed to the top of the trench and compacted as required.

606.04 Method of Measurement. Pipe underdrains will be measured by the foot (meter) complete in place.

No payment will be made for backfill material placed beyond the limiting planes for which structure excavation is allowed.

606.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
____ Underdrains	ft. (m)

Structural excavation and compacting backfill, including the removal of unsuitable material below the established grade, will be measured and paid for as provided in Section 210-Structure Excavation and Compacting Backfill.

SECTION 607 - EMBANKMENT PROTECTORS

607.01 Description. This work shall consist of furnishing and placing corrugated metal embankment protectors in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as directed.

607.02 Materials. The entrance and exit sections shall meet the applicable requirements of AASHTO M 36 or AASHTO M 196.

The discharge pipe shall meet the requirements of Subsection 706.06. Each assembly shall be either all steel or all aluminum.

607.03 Construction Requirements. The entrance device shall be so installed as to prevent water from percolating under or around the structure.

The discharge pipe shall be installed in accordance with Subsection 602.03, with the exception that where it is not possible to provide a trench for the installation, the pipe shall be securely anchored to the surface of the ground as provided in the plans.

607.04 Method of Measurement. Embankment protectors will be measured by the unit complete in place. A unit shall consist of an entrance and an exit section.

Discharge pipe will be measured by the foot (meter) complete in place.

607.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Embankment Protector, Type ___	Each
Discharge Pipe	ft. (m)

Materials necessary to pave the inlet area will be measured and paid for as provided in Section 406 - Road Mix Pavement or Section 405 - Plant Mix Pavement.

Excavation, backfill, outlet protection and anchorage will not be paid for separately but shall be considered as subsidiary work and the cost thereof shall be considered incidental to the cost of other items.

SECTION 608 - APRONS FOR PIPE

608.01 Description. This work shall consist of furnishing and installing aprons to be attached to the inlet and outlet ends of pipe culverts in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as directed.

608.02 Materials. Materials for metal aprons shall meet the applicable requirements of Subsection 708.21.

Material for concrete aprons shall meet the applicable requirements of Section 502-Concrete.

Aprons for any installation may be either metal or concrete, except pipes and attached aprons of dissimilar metals will not be permitted.

608.03 Construction Requirements. The area occupied by the apron shall be shaped to conform to the bottom of the structure and to afford a firm and uniform bearing over its entire area. Cutoff walls and areas adjacent to the apron shall be carefully backfilled to prevent undercutting or erosion.

608.04 Method of Measurement. The aprons will be measured by the unit complete in place. Culvert sections attached to aprons shall be included in the measurement of culverts.

608.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
___ Aprons for Pipe	Each
___ Metal Safety Apron (Parallel)	Each
___ Metal Safety Apron (Cross Drainage)	Each

Structure excavation and compacting backfill will not be measured and paid for on metal aprons nor for any excavation or backfill within the limits of "Dimension B" as shown on the Standard Drawing covering concrete aprons. This work shall be considered subsidiary work and the cost thereof shall be considered incidental to the cost of other items.

SECTION 609 - MINOR STRUCTURES

609.01 Description. This work shall consist of the construction of minor structures, such as drops, weirs, checks, diversion boxes, culvert and siphon headwalls, and inlet and outlet structures for canals and pipes in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as directed.

609.02 Materials. Materials shall meet the requirements of the following Sections or Subsections.

Concrete	502
Reinforcing Steel	708.02
Timber	710

Each shipment of reinforcing steel delivered to the project shall be accompanied by a completed ITD-914 with a copy of the mill test report attached for each heat included in the shipment. Field samples will be taken by the State for each heat number and bar size from material delivered to the project. The supplier must submit proper identification with each shipment delivered to a project worksite to allow the State to readily identify each bar size by heat number. Reinforcing steel delivered that cannot be identified by heat number shall be rejected and replaced by the supplier at no cost to the State.

The Contractor shall order additional bars to compensate for the field sampling. Additional sampling of the replacement bars is not required. Cutting and splicing to obtain samples is not permitted. Complete fabricated bars are to be sampled and replaced. If bar configuration is such that two 36 in. (900 mm) long test specimens can be cut from one bar, then only one such bar constitutes a field sample. Otherwise, two complete fabricated bars constitute a single field sample.

Reinforcing steel spirals shall be fabricated with additional length to accommodate sampling. No cutting that would require splicing will be permitted to obtain samples.

All bar from failing heat numbers shall be rejected and replaced by the Contractor at no additional cost to the State.

609.03 Construction Requirements. Structure excavation and compacting backfill shall meet the requirements of Section 210 - Structure Excavation and Compacting Backfill.

Minor structures shall be constructed in accordance with the applicable portions of Sections 502-Concrete, and 503-Metal Reinforcement.

609.04 Method of Measurement. Minor structures will be measured as follows:

1. Concrete by the cubic yard (cubic meter) as provided in Section 502 - Concrete.

2. Reinforcing steel by the pound (kilogram) as provided in Section 503 - Metal Reinforcement.

3. Timber and lumber by the 1000 foot board measure - MFBM (cubic meter).

4. Per Each. When minor structures are measured per each, they shall be complete in place, including concrete, metal reinforcement, timber and other related hardware.

609.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Concrete, Class 20	CY (m^3)
Metal Reinforcement	lb. (kg)
Timber, Treated	CY (m^3)

Timber, Untreated.....CY (m^3)
Minor Structures .....Each

Structure excavation and compacting backfill will not be measured and paid for, but shall be considered as subsidiary work and the cost thereof included in the contract unit prices for minor structures.

SECTION 610 - FENCES

610.01 Description. This work shall consist of furnishing and erecting wire fence and gates in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or as directed.

Contractor responsibilities shall be as shown in Subsection 107.19.

610.02 Materials. Materials shall meet the requirements of the following Subsections of Section 700 - Materials.

Barbed Wire 708.09
Woven Wire 708.10
Hardware for Barbed or Woven Wire Fence 708.11
Metal Fence Posts.....708.12
Chain Link Fence.....708.13
Wood Fence Posts 710.08

610.03 Construction Requirements. Trees, brush and other obstacles along the fence line shall be removed. Material so removed shall be disposed of in accordance with the requirements of Section 201 - Clearing and Grubbing.

Posts shall be set plumb to the spacing and depth shown on the plans, backfilled, and firmly tamped. Posts for chain link fence shall be set in concrete. After the posts are set, the wire fencing shall be stretched and fastened to wooden posts with staples or to steel posts with wire clamps.

Concrete for post and brace bases shall be Class 22 (15.0) concrete with the tops crowned to drain.

Changes in line where the angle of deflection is 30° or more shall be considered as corners, and a corner brace shall be installed. Intersecting fences shall be terminated as shown on the plans.

When drilling into rock is required to set a post, the Contractor may shorten the posts, provided a minimum length of 12 in. (300 m) of post is grouted in the rock.

At grade depressions where the change in grade within two adjacent spans of fence is 20 percent or more, sag bracing shall be installed. If it is necessary to cut and splice woven wire fence to accommodate the grade change, the splice shall be made at a line post or an additional post shall be installed at the splice.

Air temperature shall be considered when stretching wire; in very hot weather the wire shall be stretched just tightly enough to eliminate sags; in cold weather the wire shall be stretched very tightly. Woven wire shall not be stretched so tightly that the pre-formed kinks in the horizontal wires are straightened.

Intersecting fences shall be braced at the intersection of the new fence with a terminal brace as shown on the plans.

Horizontal and inclined wood braces shall be 4 in. x 4 in. (100 mm x 100 mm) No. 2 Common Douglas Fir or Larch. Posts shall be dapped to receive the braces, and the ends of the brace anchored with 3 - 16d nails or a 3/8 in. x 4 in. (10 mm x 100 mm) steel dowel. Daps on the posts and the ends of the braces shall be given a coat of pentachlorophenol solution, chromated copper arsenate (CCA) or ammoniacal copper zinc arsenate (ACZA) before assembly. Brace wires shall consist of two loops of 9 gage (4 mm) wire placed as shown on the plans and twisted to form a taut cable. The posts shall be lightly notched to position the wire, and 3 staples driven at each notch to secure the wire.

No barbed or woven wire fence shall extend more than 660 ft. (200 m) between adjacent corner braces, gate braces, terminal braces, or line braces. Line braces shall be installed at reasonably uniform intervals so the distance between any two braces is 660 ft. (200 m) or less. Two staples shall be used at each wire on wood braces, or the fence wires shall be wrapped around the post and tied off.

On metal braces, the tie wires shall be securely spliced to the fence on both sides of the posts in such a manner that there are two loops behind the post and one loop in front, or the fence wires shall be wrapped around the post and tied off. The concrete

blocks for the angle braces shall be so located that a minimum of 6 in. (150 mm) of the angle brace is embedded in the concrete.

No chain link fence shall extend more than 300 ft. (90 m) between adjacent braces. Line braces shall be installed at reasonably uniform intervals so the distance between any two braces is 300 ft. (90 m) or less.

Posts for chain link fence shall be bonded to a ground located at the bottom of the concrete foundation at locations where the chain link fence passes under a power line. Line posts for chain link fence built parallel to a power line shall be grounded not less than every 300 ft. (90 m) at each brace.

610.04 Method of Measurement. Fence will be measured along the slope of the bottom wire by the foot (meter) complete in place excluding the length between gate posts except for type 1 Gates. Gates will be measured by the number complete in place of the size and type specified in the contract and plans except for type 1 Gates. Type 1 Gates will be measured by the number complete in place for the construction of the gate including the braces and fasteners for all sizes of gates. The length of type 1 Gates shall be included in the measurement for Wire Fence. Two type 2 Gates installed in a single opening will be measured and paid for as two gates.

Braces will be measured by the number complete in place and shall include line braces, corner braces and terminal braces constructed of metal or wood. The cost of gate braces shall be included in the cost of the gate. The cost of sag braces shall be included in the cost of the fence. Braces for chain link fence will not be measured separately, and the cost of these braces shall be included in the cost of the chain link fence.

610.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Fence, Type ___	ft. (m)
Gates, Type 1	Each
Gates, Type ___	Each
Braces	Each

No separate payment will be made for clearing for fence, but this work shall be considered as subsidiary work and the cost thereof included in the contract unit prices for fence items.

SECTION 611 - CATTLE GUARDS

611.01 Description. This work shall consist of constructing cattle guards in accordance with the plans and these specifications at the established locations and in reasonably close conformity with the grades shown on the plans or as directed.

611.02 Materials. The material used shall meet the requirements of Section 502 -Concrete, Section 503 - Metal Reinforcement, Section 504 - Structural Metals, Section 602 -Culverts, and Section 610 - Fences.

611.03 Construction Requirements. Grading shall be completed at the location of the cattle guard before excavation for the cattle guard is started. The structure shall be backfilled with granular material as directed in accordance with Section 210 - Structure Excavation and Compacting Backfill.

611.04 Method of Measurement. Cattle guards will be measured by the number installed complete in place. The end panels and posts shall be included with the cattle guard, and the distance between the posts excluded from measurement for fence.

611.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
___ Cattle Guards, Type ___	Each

No separate payment will be made for structural excavation or compacting backfill; this work shall be considered as subsidiary work and the cost thereof included in the contract unit price for cattle guards.

SECTION 612 - GUARDRAIL

612.01 Description. This work shall consist of furnishing and erecting guardrail in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or established by the Engineer.

612.02 Materials. Materials shall meet the requirements of the following referenced specifications:

Concrete 502
Reinforcing Steel 708.02
Steel Guardrail and Fitting.....708.14
Aluminum Rail and Fittings 708.25
Posts.....710.03

Wire rope shall be 1/2 in. (12 mm) diameter pre-formed 6 x 19 or 6 x 25 improved plow steel with independent wire rope core or 5/8 in. (16 mm) diameter pre-formed 6 x 19 improved plow steel with independent fiber core. A minimum breaking strength of 19,200 lb. (85.4 kN) shall be required. Painting or galvanizing is required.

612.03 Construction Requirements.

A. *Metal Guard Rail.* Posts shall be spaced as shown on the plans and be set plumb and to the established lines and grades. Backfill material shall then be placed in layers and thoroughly tamped. Boring of wood posts should be done before treating, but field boring will be permitted providing the hole is treated per Subsection 710.09-Preservative Treatment, creosoted before driving the bolts.

Unless otherwise provided, the Contractor may use galvanized steel rail or aluminum rail. Only one of these types may be used on the work without approval except that extensions to existing installations shall conform to the type in place.

Posts may be driven if this can be done without damage to posts, pavement, shoulders, or adjacent slopes. If pilot holes are necessary to prevent such damage, fill any remaining voids between post and soil with dry sand or pea gravel. Misaligned, loose, or damaged posts shall be removed, replaced or reinstalled at the at Contractor's expense. Any damage to the existing pavement or base will shall be repaired at the Contractor's expense.

B. *Concrete Rail.* All exposed metal and non-galvanized wire rope shall be thoroughly cleaned and painted with one coat of Formula No. 10, TT-P-38.

All metal reinforcing shall be No. 5 (No.16) bars and all bends shall have a 2 in. (50 mm) radius.

Curing of concrete rail shall conform to the requirements of Subsection 502.03 - *Curing.*

Furnish one 1 in. x 29.5 in. (25 mm x 750 mm) connecting pin with each 10 ft. (3 m) section. The pin shall be a 1 in. x 30 in. (25 mm x 750 mm) Hot Rolled Steel Bar, Merchant Quality ASTM A-575 or Structural Steel ASTM A-36/36M with a 1 in. (25 mm) washer welded to the end as shown on the plans.

Furnish one 1.25 in. x 36 in. (30 mm x 900 mm) drift pin with each end section and one 1 in. x 30 in. (25 mm x 750 mm) connecting pin with two end sections with a 1 in. (25 mm) washer welded to the end as shown on the plans. The drift pin shall be pointed on one end.

All units of concrete guardrail to include connector and transition section shall be pre-cast upside down with concrete finished as follows:

Ordinary Surface Finish. This work shall be done in accordance with Subsection 502.03.

If painting is required, it will be noted in the special provisions or on the plans and shall be applied in accordance with Subsection 627.03 - *Painting Concrete.*

Concrete rail shall be set to the line and grade established.

612.04. Method of Measurement. The concrete guardrail will be measured by the foot (meter) complete in place and shall not include the terminal sections. Concrete Guardrail Terminal Section Type A, Concrete Parapet Connector, Concrete Guardrail Connector and Concrete Guardrail Transition will be measured by the number installed complete in place.

Metal guardrail and metal median barrier will be measured by the foot (meter) complete in place including the length of metal rail in the terminal. Terminal sections will be measured by the number installed complete in place.

The unit price bid for terminals shall include terminal plates, spacers, additional posts, post blocks and all appurtenances necessary for a complete installation in accordance with the standard drawings as applicable.

612.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Metal Guardrail	ft. (m)

Metal Median Barrier, Type ___ .....ft. (m)
Metal Terminal Section, Type ___ .....Each
Concrete Guardrail .....ft. (m)
Concrete Terminal Section, Type A.....Each
Pre-cast Concrete Parapet Connectors .....Each
Pre-cast Concrete Guardrail Connector .....Each
Pre-cast Concrete Guardrail Transition.....Each

SECTION 613 - SIDEWALKS

613.01 Description. This work shall consist of the construction of sidewalks in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or as directed.

613.02 Materials. Materials for bituminous sidewalks shall meet the applicable requirements of Section 405 - Plant Mix Pavement or Section 406 - Road Mix Pavement. Materials for concrete sidewalks shall meet the applicable requirements of Section 502 - Concrete.

613.03 Construction Requirements. The area on which the construction is to be done shall be graded and compacted to 90 percent density in accordance with the requirements of Section 205 - Excavation and Embankment.

Bituminous sidewalk shall be constructed in an approved manner.

Portland cement concrete shall meet the requirements of Section 502 - Concrete with the following exceptions:

1. *Finishing Concrete.* Concrete sidewalks shall be finished in accordance with Section 614 – Urban Approaches.

2. *Joints.* Joints shall be constructed as shown in the standard drawings.

3. *Curing.* Curing shall be done in accordance with Section 614 – Urban Approaches.

613.04 Method of Measurement. Sidewalks will be measured by the square yard (square meter) of finished surface complete in place.

613.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Concrete Sidewalk	SY (m^2)
Bituminous Sidewalk	SY (m^2)

Base aggregate, if required, will be paid in accordance with Section 303 - Aggregate Base Course.

SECTION 614 - URBAN APPROACHES

614.01 Description. This work shall consist of construction of urban approaches in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or as directed.

614.02 Materials. Materials for bituminous urban approaches shall meet the applicable requirements of Section 405 - Plant Mix Pavement or Section 406 - Road Mix Pavement. Materials for concrete urban approaches shall meet the applicable requirements of Section 502 - Concrete.

614.03 Construction Requirements. The area on which the construction is to be done shall be graded and compacted to 90 percent density in accordance with Section 205 - Excavation and Embankment.

Bituminous urban approaches shall be constructed in accordance with the requirements of Section 405 - Plant Mix Pavement or Section 406 - Road Mix Pavement, as specified.

Concrete shall meet the requirements of Section 502 - Concrete with the following exceptions:

A. *Finishing Concrete.* Concrete urban approaches shall have a float finish. The surface shall be slightly rough, but uniform. The edges of the slab and joints shall be edged with a 1/4 in. (6 mm) radius edging tool. Immediately after the removal of forms, any honey-combed or rough spots shall be corrected using mortar consisting of one part cement and two parts of approved sand.

Earth or other approved material shall then be placed against the edge of the driveway and be shaped and compacted to conform to the typical section.

B. *Curing.* Immediately after finishing, the concrete shall be cured in accordance with the requirements of Subsection 502.03.

During freezing weather the Contractor shall protect the concrete from damage by covering with burlap, straw, or earth, or a combination of them sufficient to prevent damage to the concrete, and shall maintain such covering for a minimum of five days.

614.04 Method of Measurement. Bituminous or concrete urban approaches will be measured by the number constructed. Concrete for urban approaches will be measured by plan quantities.

614.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Urban Approaches	Each
Concrete for Urban Approaches	CY (m^3)

The quantities of bituminous surfacing used shall be included in the quantities of material as provided in Section 405 - Plant Mix Pavement or Section 406 - Road Mix Pavement. Base aggregate, if required, will be paid in accordance with Section 303 - Aggregate Base Course.

SECTION 615 - CURB AND GUTTER

615.01 Description. This work shall consist of constructing curb, gutter, combination curb and gutter, or traffic separators in accordance with the specifications and in reasonably close conformity with the lines and grades shown on the plans or as directed.

There shall be four types of curb, gutter and traffic separators as follows:

Type A sections shall be cast-in-place Portland cement concrete.
Type B sections shall be pre-cast Portland cement concrete.
Type C sections shall be extruded Portland cement concrete.
Type D sections shall be extruded asphalt concrete.

If more than one type is shown on the plans at a specified location, the Contractor may construct either type specified.

615.02 Materials. Materials shall meet the following requirements:

Concrete for Type A, B and C Sections 502
Portland Cement 701
Asphalt 702
Aggregate 703
Reinforcing Steel 708.02
Fly Ash 714

615.03 Construction Requirements.

A. *Formed Sections.* Forms shall be of wood or metal, straight and free from warp, and of sufficient strength to resist springing while placing concrete. Where a section must be constructed on a curve, straight lengths of the section shall be short enough that the middle ordinate to the curve from the face of the section does not exceed 1/2 in. (12 mm), or the section shall be continuously curved.

Curbs, gutters, or combination curb and gutter shall be constructed in uniform sections 9.84 ft. (3 m) in length, except where shorter sections are necessary for closures or on curves, but no section shall be less than 3.28 ft. (1 m) long. These sections shall be separated by steel templates conforming to the cross section of the curb, set perpendicular to the face and top of the curb, or combined curb and gutter, and held securely in position so as not to become displaced during placing of concrete. The templates shall not be less than 1/8 in. (3 mm) nor more than 3/16 in. (5 mm) in thickness, and of such length, depth and cross section as will completely separate the sections and permit their removal. The templates shall be left in place until the concrete has set sufficiently to hold its shape, after which they shall be carefully removed without injury or marring the concrete. Immediately after removal of the templates, the joints shall be lightly tooled along the face and top of the curb. Templates shall be thoroughly cleaned and oiled before using. Forms shall be removed within 24 hours after the concrete has been placed.

1. *Type A Sections*. While the concrete is still green, the top and front face or other exposed portions of the curb, gutter, or combination curb and gutter, shall be thoroughly floated with a moist wooden float to produce a uniform even surface. Form marks and other irregularities shall be removed.

The back edge of the curbs and the edge of the gutter adjacent to the pavement shall be rounded with an edge of 1/4 in. (6 mm) radius. Honeycombed areas in the back of the curb which, in the opinion of the Engineer, are not detrimental to the curb need not be patched.

2. *Type B Sections.* The curbs and separators shall have a smooth, glassy finish on exposed surfaces. Excess honeycombing in the back of the curb may be cause for rejection. Honeycombed areas in the back of the curb which, in the opinion of the Engineer, are not detrimental to the curb need not be patched.

   The curb and separators shall be manufactured according to the dimensions and shapes shown on the plans within a tolerance of 1/4 in. (6 mm) in length and 1/8 in. (3 mm) in alignment.

   The curb shall be made in pieces not less than 5 ft. (1.5 m) nor greater than 9 ft. (3 m) in length, except in special instances where shorter lengths are required. Circular curbing shall be made for radii of 10 ft. (3 m) or less as called for on the plans. For radii from 10 ft. (3 m) to 600 ft. (180 m), the curb shall be cast in straight pieces with beveled ends, the length of which shall vary between 1 ft. and 8 ft. (0.3 m and 2.4 m) as required to keep the middle ordinate 1/4 in. (6 mm) or less. The ends of the pieces shall be beveled so that the space between adjacent pieces will not vary more than 1/8 in. (3 mm) in width. For any radius larger than 590.55 ft. (180 m), the curb pieces shall be straight and the ends shall be square.

   Not more than 2 percent of the top area in any one piece of curb shall be defective. There shall be not more than 30 air holes in any 1 ft. (0.3 m) of curb nor more than 50 in any 3 ft. (1 m) of curb. An air hole is defined as any hole 1/8 in. (3 mm) or larger in diameter and depth.

   Except where expansion joints are to be placed, joints between adjacent pieces of curb or separator shall be filled with bedding mortar.

   The curb or separator shall be firmly bedded for its entire length and breadth on a mortar bed composed of 1 part Portland cement and 2 parts of approved sand.

Before the cement mortar bed is laid, dirt shall be cleaned from the pavement surface by washing.

When bonding to hardened Portland cement concrete, an epoxy resin system meeting the requirements of AASHTO M 235 (hardened concrete to hardened concrete) shall be used. Furnishing the material and doing the work prescribed under this item will not be paid for separately but shall be considered as Subsidiary work.

B. *Extruded Sections.* The material for extruded sections shall pass through an orifice or plate by the pressure from an auger feed or other approved means.

The machine used for asphalt concrete shall be heated by ducting exhaust gases or heat from auxiliary burners over the surface of the orifice. The machine shall be mounted on skids to apply sufficient resistance to movement to properly compact the curb or traffic separator.

The machine used for Portland cement concrete shall be mounted either on casters or on wheels which can be steered.

1. *Type C Sections*. Concrete shall be fed uniformly to the machine and be of such consistency that after extrusion the concrete will maintain the designated shape.

   Unless otherwise permitted the Contractor shall use either gradation No.1 or No. 2.

   Contraction joints shall be constructed at 10 ft. (3 m) intervals to a minimum depth of 2 in. (50 mm) for all exposed surfaces by sawing or cutting through the newly placed concrete with a plate or similar approved device.

   The surface shall be touched up as necessary with a trowel and then given a fine brush finish with brush strokes parallel to the line of the sections.

   When bonding to hardened Portland cement concrete, an epoxy resin system meeting the requirements of AASHTO M 235 (plastic concrete to hardened concrete) shall be used. Furnishing the material and doing the work prescribed under this item will not be paid for separately but shall be considered as subsidiary work.

2. *Type D Sections.* The surface on which the curb is to be placed shall be tacked with an approved asphalt if required.

   The asphalt mixture shall be mixed at the temperature directed in an approved pugmill type mixer for not less than 40 seconds. The mixer shall have a capacity of not less than 3 CF (0.08 m^3). The aggregate shall be heated to conform to the temperatures for the mixture specified and shall contain not more than 1 percent moisture. The asphalt concrete shall be uniformly fed to the machine and shall be at a temperature which will avoid either sloughing of the material or tearing of the surface.

Immediately after finishing, Type A and C sections, the concrete shall be cured in accordance with the requirements of Subsection 502.03. During freezing weather the Contractor shall protect the concrete from damage by using additional cover or heating devices, as ordered.

Approved backfill material shall be placed in layers behind curbs and thoroughly compacted.

615.04 Method of Measurement. Curb and combination curb and gutter will be measured by the foot (meter) along the face of the curb. Traffic separators and gutters will be measured by the foot (meter) along the centerline of the units. No deductions in length will be made for embankment protectors installed in the curb or for catch basins or drop inlets installed in the gutters.

Raised channelization and treatment will be measured by the number installed complete in place.

615.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Curb, Type ___	ft. (m)
Gutter, Type ___	ft. (m)
Combination Curb and Gutter, Type ___	ft. (m)
Traffic Separator, Type ___	ft. (m)
Raised Channelization End Treatment	Each

The asphalt and asphalt mix will be paid for under the appropriate items of Section 400 - Surface Courses and Pavement.

Excavation, backfill and asphalt for tack coat will not be paid for separately but shall be considered as subsidiary work and the cost thereof shall be included in the cost of curb and gutter items.

SECTION 616 - SIGNS AND SIGN SUPPORTS

616.01 Description. This work shall consist of furnishing and installing signs in accordance with these specifications and in reasonably close conformity with the lines, grades and locations shown on the plans or as directed.

Signs are classified as the following types:

Type A - Extruded aluminum panels with a reflectorized removable cutout legend and a porcelain enamel or a polyester powder coating background, or approved equal.

Type B - Sheet aluminum with a reflective sheeting background. The legends shall consist of silk screen paste, plastic lettering film, or reflective sheeting.

Type C - Extruded aluminum panels with a reflectorized removable cutout legend and a reflective sheeting background.

Type E - A 1/2 in. (12 mm) plywood with a reflective sheeting background. The legends shall consist of silk screen paste, plastic lettering film, or reflective sheeting.

616.02 Materials. Materials shall meet the requirements of the following:

Concrete 502
Steel and Aluminum Sign Supports 708.17
Hardware for Signs 708.18
Extruded Aluminum 708.26
Sheet Aluminum 708.27
Wood Sign Posts and Snow Poles 710.02
Plywood for Type E Signs 712.01
Reflective Sheeting 712.02
Reflectorized Removable Cutouts 712.03
Porcelain Enamel.....712.05
Polyester Powder.....712.06

Silk Screen Paint 712.07
Silk Screen Paste 712.08
Plastic Lettering Film 712.09

616.03 Construction Requirements. Where specifications require that the Contractor design sign supports of any type, design shall be in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals in effect at the time of bid opening. Unless otherwise approved by the Engineer, the design of supports or check of plans shall, at the Contractor's expense, be performed by an Engineer registered in the state of Idaho; said Engineer shall affix his, or her, seal, signature and date thereof to each sheet of plans and the design calculations.

Prior to fabrication, the contractor shall submit six sets of shop plans and three sets of design calculations for approval.

One set of mylar shop plans, as approved, shall be furnished by the Contractor.

One set of final manufacturer's shop drawings shall be provided on 3 1/2 in. disk media. The drawings shall be in one of the following formats in order of preference:

1. Microstation.dgn

2. Auto CAD/D.dwg

3. .dxf

If a roadway luminaire is to be installed on a vertical member of the sign support, the luminaire arm shall be included as part of the sign support. The luminaire shall be assumed to weigh 50.7 lb. (23 kg).

Sign panels shall be assumed to weigh 4 psf (19.5 kg/m^2). Sign lights shall be assumed to weigh 55 lb. (25 kg) each.

All welding and inspection shall be in accordance with the latest AWS D1.1 Structural welding code and AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Verification inspection shall be the responsibility of the fabricator. The fabricator shall employ an independent inspection agency for this purpose, completely separate from the organization performing

fabrication inspection and testing. Copies of all verification inspection reports shall be submitted directly to the Engineer by the Inspection agency.

Materials incorporated into sign supports and structures shall be certified by the manufacturer as meeting applicable specifications.

If the nature of material encountered in excavating is such that a foundation hole cannot be satisfactorily augered, a formed cylindrical foundation or alternate square foundation may be used.

Where solid rock is encountered and cannot be augered or excavated to the required depth, the rock may be drilled to accept the vertical reinforcing steel and anchor bolts which shall be grouted in place. Reinforcing steel may be eliminated from those foundations where this method of construction eliminates 75 percent or more of the specified concrete foundation depth.

Concrete shall be protected from freezing for a period of not less than 7 days.

Pre-cast concrete foundations of the sizes specified may be used as an alternate to cast in place concrete foundations.

Backfill for formed foundations shall be placed and compacted as specified in Section 210 - Structure Excavation and Compacting Backfill.

Prior to the application of reflective sheeting to plywood, all grease, dirt or wax shall be removed by one of the following methods:

1. Buff surface lightly with solvent-soaked steel wool (fine to medium). Use solvents such as white gasoline or naphtha. Solvents that attack or soften the surface shall not be used. Wipe dry with clean cloths.

2. Sand panel lightly with fine graded paper, clean with solvent, and wipe dry with clean cloths.

616.04 Method of Measurement.

A. *Signs.* Signs will be measured to the nearest 0.1 SF (0.01 m^2) of the sign face area, complete in place. The area of any sign shall be the area of the smallest rectangular shape that will encompass the sign panel except for triangular signs

which will be measured by a triangular shape. Route markers which are riveted to the face of larger signs will be measured and paid for as separate items.

B. *Breakaway Sign Posts.* Breakaway steel sign posts of the type specified will be measured by the pound (kilogram), based upon calculated weights of the total length of post, all exclusive of galvanizing. Breakaway wood sign posts of the type specified will be measured by the 1000 foot board measure - MFBM (cubic meter).

C. *Sign Brackets and Brace Angles.* Sign brackets and brace angles will be measured by the pound (kilogram) based upon the calculated weights of the sign brackets and brace angles. Calculated weights of sign brackets and brace angles will be based upon the tables shown on the plans. The calculated weights shall be all exclusive of galvanizing.

D. *Breakaway Steel Sign Post Installation.* Breakaway steel sign post installations will be measured per each sign post installation by the type of steel sign post. Type A and Type B steel sign post installations will include the breakaway hinge below the sign on two post installations, the breaksafe base assembly, the foundation, all drilling, galvanizing, miscellaneous hardware and refinishing the ground surface. Type E steel sign post installations will include the foundation, galvanizing, miscellaneous hardware, and refinishing the ground surface.

E. *Overhead Sign Structures.* Overhead sign structures will be measured per each complete in place, including the foundations.

616.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Signs, Type ___	SF (m^2)
Overhead Sign Structure	Each
Sign Brackets and Brace Angles	lb. (kg)
Breakaway Steel Sign Posts, Type ___	lb. (kg)
Breakaway Wood Sign Posts, Type ___	MFBM (m^3)
Breakaway Steel Sign Post Installation Type ___	Each

Signs installed prior to their needed use which interfere with proper traffic flow will be covered and uncovered at no additional cost to the State.

SECTION 617 - DELINEATORS, MILEPOSTS AND KILOMETER POSTS

617.01 Description. This work shall consist of furnishing and installing delineators and mileposts or kilometer posts in accordance with these specifications and in reasonably close conformity with the lines, grades, and locations shown on the plans or as directed.

617.02 Materials. Materials shall meet the requirements of the following Subsections of Section 700 - Materials.

Milepost or Kilometer post Plates 708.15
Rigid Posts for Delineators, Snow Poles, and Mileposts
or Kilometer posts 708.16
Reflective Sheeting 712.02
Reflector Units for Delineators 712.04
Silk Screen Paste 712.08
Flexible Post Delineators.....712.10

617.03 Construction Requirements. Delineator, mileposts and kilometer posts shall be set plumb to the established lines and grades.

If the milepost or kilometer post location is within 50 ft. (15 m) of an established delineator, the delineator installation shall be removed.

Any existing delineator, milepost or kilometer post, reflector, plate or assembly to be replaced with new installations shall be removed and shall become the property of the Contractor.

A. *Rigid Post Delineator, Milepost and Kilometer Post*. If post is driven, an approved metal driving cap which fits snugly around the post shall be used. A minor amount of bending and twisting to align the post may be permitted.

Concrete foundations for mileposts or kilometer posts may be either pre-cast or poured in place. They shall be square. Milepost or kilometer post plates shall not be attached until the concrete has set.

If pre-cast foundations are used, the foundation hole may be excavated to dimensions larger than the concrete foundation and then backfilled with approved material and tamped.

Reflector units for delineators shall not be attached until the installation of the post is complete.

Each barrier or ground mount delineator shall be the same manufacturer brand and style throughout the project, unless approved by the Engineer.

B. *Flexible Post Delineators*. Flexible delineators shall be installed according to the manufacturer's recommendations. Prior to the installation, the Contractor shall provide the Engineer with the manufacturer's recommended installation procedures.

C. *Barrier Mounted Rigid Delineators*. Rigid post mounted delineators mounted to the barrier shall be installed per ITD Standard Drawings. Rigid non-post mounted delineators attached with anchors or adhesive pads may be side or top mounted and shall be installed as recommended by the manufacturer. Prior to the installation, the Contractor shall provide the Engineer with the manufacturer's recommended installation procedures.

D. *Barrier Mounted Flexible Delineators*. Flexible delineators shall attach to the barrier guardrail with either a factory applied adhesive on the delineator base with release paper or an anchor mounting. Flexible delineators may be side or top mounted. Flexible delineators mounted to the barrier guardrail shall be installed as recommended by the manufacturer. Prior to the installation, the Contractor shall provide the Engineer with the manufacturer's recommended installation procedures.

617.04 Method of Measurement. Delineators and mileposts or kilometer posts will be measured by the number installed, per type, complete, in place.

617.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Delineators, Type ___	Each
Mileposts, Type ___	Each
Kilometer Posts, Type ___	Each

SECTION 618 - MARKER POSTS, WITNESS POSTS, AND STREET MONUMENTS

618.01 Description. This work shall consist of furnishing and placing posts for right-of-way, reference and project markers; witness posts; and street monuments

when called for, in accordance with these specifications and in reasonably close conformity with the lines and locations shown on the plans or as directed.

618.02 Materials. Concrete for the posts and street monuments shall conform to Section 502 - Concrete, except that for project markers an approved white Portland cement shall be used.

After the project markers have dried thoroughly, the letters shall be added in conformance with the plans using two coats of an approved black paint. The first coat shall be thoroughly dry before the second coat is applied.

If light weight aggregates are used, the aggregates shall conform to ASTM C 330.

Brass caps shall conform to Subsection 708.28.

Steel witness posts shall conform to Subsection 708.16, except that the holes may be omitted.

Wood witness posts shall be well seasoned, straight and sound cedar or fir and shall be treated in accordance with Section 710 - Timber and Preservatives.

Wood witness posts shall be painted white, with one coat of Formula No. 6, and two coats of Formula No. 11 in accordance with Subsection 627.03.

Fiberglass witness posts shall be single piece markers capable of simple, permanent installation by one person using a manual driving tool. The posts, upon proper installation, shall resist displacement from wind and vehicle impact forces. The posts shall be of a constant "T" cross section design which provides a flat surface for sheeting application and a reinforcing rib incorporated longitudinally along the back midsection to provide structural rigidity. The bottom end of the markers shall be pointed for ease of ground penetration.

Fiberglass witness posts shall have the following mechanical properties:

PROPERTY	ASTM TEST METHOD	MINIMUM VALUE
Ultimate Tensile Strength	D-638/638M	20,000 psi (138 MPa)
Specific Gravity	D-792	1.7
Weight percent Glass Reinforcement	D-2584	50 percent
Barcol Hardness	D-2583	47

Fiberglass witness posts shall be constructed of a durable, UV resistant, continuous glass fiber and marble reinforced, thermosetting composite material which is resistant to impact, ozone, and hydrocarbons within a service temperature range of -40°F to +140°F (-40°C to 60°C). The posts shall be uniformly colored throughout the entire cross section. Ultraviolet resistant material shall be incorporated in the construction to inhibit fading or cracking of the markers upon field exposure. The markers shall exhibit negligible color fading after 2,000 hours Xenon Arc Exposure (ASTM G-26).

618.03 Construction Requirements. Project markers shall be set at the ends of the projects where directed.

Right-of-way markers, reference markers, witness posts, and street monuments shall be set at designated points. Markings shall be made and recordings filed under the supervision of a Land Surveyor licensed in the State of Idaho when required by code. No separate payment will be made for endorsements or filing fees when such work is included in items for contract surveying.

A hole shall be excavated of sufficient size to permit adjustment of the marker post to the lines required. The posts shall be aligned as directed and the hole shall be backfilled with suitable material which shall be carefully tamped in place.

The upper 3 ft. (1 m) of the posts for project markers and the upper 12 in. (300 m) of the posts for right-of-way markers shall be given a rubbed surface finish in accordance with Section 502 and shall then be cured for a minimum period of 14 days before use.

618.04 Method of Measurement. Project, right-of-way and reference markers; witness posts; and street monuments will be measured by the number complete in place.

618.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Project Markers	Each
Right-of-Way Markers	Each
Reference Markers	Each
Witness Posts	Each
Street Monuments	Each

SECTION 619 - ILLUMINATION

619.01 Description. This work shall consist of furnishing and installing illumination of one of the following types in accordance with these specifications and in reasonably close conformity with the plans or as directed.

Type 1 shall be multiple circuit, high pressure sodium sign lighting which operates with the use of individual lamp ballasts.

Type 2 shall be multiple circuit, high pressure sodium street lighting which operates with the use of individual lamp ballasts.

The Contractor shall furnish and install all electrical conduit, wiring, luminaires, poles, pole foundations, and electrical equipment necessary for the construction of a complete lighting system as shown on the plans.

619.02 Materials. All materials furnished by the Contractor shall bear the seal of approval of the Underwriter Laboratories, Inc. or shall meet the requirements of the National Electrical Manufacturer's Association, as appropriate. In addition to the requirements of the plans, specifications and special provisions, all material and workmanship shall conform with the National Electrical Code and shall meet all local codes and requirements of the connecting utility.

Material shall meet the requirements of the following:

Concrete 502
Illumination Poles and Bases 708.19
Service Poles for Illumination 710.06
Pole Keys 710.07
High Pressure Sodium Vapor Luminaires 713.01
High Pressure Sodium Vapor Ballasts 713.02
Rigid Steel Conduit 713.03
Rigid Plastic Conduit 713.04
Concrete Junction Boxes 713.05
Composite Junction Boxes 713.06

The Contractor shall submit for approval a list of all equipment and all materials proposed for installation. Each item listed shall include manufacturer's name, size and catalog number.

619.03 Construction Requirements.

A.. *General.* Where soil conditions permit, excavation for pole foundations shall be made to the neat lines of the foundation and the concrete placed directly against the sides of the excavation.

Where soil conditions do not permit the above procedure, the foundations shall be formed and the concrete placed as required in Section 502 - Concrete. Backfill shall then be placed and compacted in accordance with Section 210 - Structure Excavation and Compacting Backfill.

B. *Conduit Installation.*

1. *General.* Trenches shall be backfilled and compacted in accordance with Section 210 - Structure Excavation and Compacting Backfill, and resurfaced with material equal to that removed.

Underground conduit shall be placed not less than 24 in. (600 mm) below the finished surface unless otherwise shown on the plans, and shall not conflict with poles, guardrail or posts, sign foundations, etc.

Exposed service conduit shall be rigid steel. Conduit attached to utility company poles shall be mounted on the pole as directed by utility company.

Standard manufactured elbows, bends, tees, couplings, or other fittings shall be used throughout the conduit lines. All bends in the conduit shall be made by the use of standard factory bends and couplings or by bending the conduit. When factory bends are not used, conduit shall be bent without kinking or flattening using the longest radius practicable.

Conduit shall be inspected and approved before backfilling is started.

Conduit runs shall be separated by a minimum of 3 in. (75 mm) of sand or soil cushion.

Underground hazard tape shall be placed in the fill 12 in. (300 m) above all conduits. The tape for AC electrical circuits shall be red in color, 6 in. (150 mm) wide and have the legend: “Caution Caution Caution Electrical Line

Buried Below" imprinted in black, Panduit Insta- Code Catalog No. HTU6RE. The tape for low voltage, DC referenced circuits, shall be orange in color, 3 in. (75 mm) wide, without legend, Panduit Insta-Code Catalog No. HT3- ORN.

2. *Rigid Steel Conduit.* Conduit ends shall be cut square and well reamed to remove burrs and rough edges. Conduit ends shall be threaded and capped with standard conduit caps until wiring is started. When the caps are removed, the threaded ends shall be provided with insulated metallic conduit bushings.

   Expansion fittings shall be installed where conduit crosses an expansion joint in the structure. Minimum expansion per fitting shall be 4 in. (100 mm).

   When the trench bottom is unsuitable material such as rock, hardpan, or other unyielding material, conduit shall be placed on a 3 in. (75 mm) minimum bedding of tamped sand or soil.

   Backfill shall pass a 3 in. (75 mm) screen.

3. *Rigid Plastic Conduit.* Conduit joints shall be securely fastened together by solvent welding. Bending of conduit shall be carefully done to avoid damage and without the use of an open flame. Bends sharper than 45° shall not be permitted in plastic conduit.

   To allow for expansion and contraction of plastic conduit during installation of long runs, one end shall be left unconnected, or an O- ring expansion coupling shall be inserted near one end of the run until final covering of the conduit is in progress.

   Free ends of conduit shall be capped to prevent the entry of moisture, dirt, or rocks.

   Conduit shall be placed on a 3 in. (75 mm) minimum bedding of tamped sand or soil. Backfill to a compacted depth of 6 in. (150 mm) above and 6 in. (150 mm) each side of the conduit shall be sand or soil free from rocks or hard lumps. The remaining cover over the conduit shall pass a 3 in. (75 mm) screen.

Junction boxes shall have a minimum of 6 in. (150 mm) of clean sand and gravel, 3/4 in. (19 mm) maximum, placed under them for drainage.

All junction boxes subjected to traffic loads shall be mounted on a concrete base.

The outside dimensions of the concrete base shall be a minimum of 6 in. (150 mm) larger than the outside dimensions of the junction box with a minimum thickness of 4 in. (100 mm). A drain hole approximately 4 in. (100 mm) in diameter shall be provided through the base.

The concrete base shall not be constructed until all conduit under the base has been installed, backfilled and compacted in accordance with Section 210 - Structure Excavation and Compacting Backfill.

The top of the box shall be 1 in. (25 mm) above the surrounding ground elevation except when located in a sidewalk or roadway where it shall be installed flush with the surrounding surface.

Each pole shall be plumbed after all pole mounted items and service conductors are in place.

Powdered soapstone, talc, or other approved lubricants shall be used when inserting conductors in conduit. Before proceeding to pull wire in underground conduit runs, the Contractor shall clean all dirt or accumulations of moisture from conduit runs.

Conductors shall be spliced by means of approved connectors. No conductor splicing shall be permitted except in pole bases or junction boxes.

Poles on an underground service system shall be interconnected and attached to the service ground by means of a No. 8 AWG THWN soft drawn stranded copper wire.

Luminaires shall be leveled as per the manufacturer's recommendations after the pole has been placed.

Slip base breakaway devices shall be attached to the foundation anchor bolts with hex nuts and flat washers. The lighting standard shall be connected to the slip base with high strength bolts with hexagon nuts and plate washers. A plate shall be used to retain the bolts in the proper position. The bolts shall be torqued according to the manufacturer's recommendation.

The support coupling breakaway device shall be threaded on the anchor bolts to within 1/8 in. to 3/8 in. (3 mm to 10 mm) of the foundation and leveled. The lighting standard shall be connected to the support coupling with flat washers and aluminum torque limiting nut that has been designed to shear at the torque specified by the coupling manufacturer. The support couplings shall be surrounded by an aluminum skirt fastened with stainless steel sheet metal screws.

If it becomes necessary to drill a hole or if the galvanizing is damaged on galvanized steel poles prior to or during installation, the exposed metal shall be thoroughly wire brushed to remove loose and cracked spelter coating, after which the cleaned area shall be painted with two coats of Formula No. 14 Section 707 - Paint.

Field testing shall consist of 14 consecutive days of normal operation. The Contractor shall give written notice when the lighting system is complete and prior to commencing the operational test.

619.04 Method of Measurement. Illumination of the type specified will be measured on the lump sum basis complete in place.

619.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Illumination, Type ___	Lump Sum

Excavation, backfilling, surfacing and materials will not be paid for separately, but shall be considered as subsidiary work and the cost thereof included in the contract price for illumination.

SECTION 620 - PLANTING

620.01 Description. This work shall consist of furnishing and planting trees, shrubs, vines and ground cover in accordance with these specifications and in reasonably close conformity with the plans or as directed.

620.02 Materials. Materials shall meet the requirements of the following Subsections.

Plants	711.06
Fertilizer (Commercial)	711.07
Soil Conditioner	711.08

Select Topsoil 711.09
Mulch 711.10
Water.....711.12

620.03 Construction Requirements. Unless otherwise approved, planting operations shall be performed between September 15 and May 15, and shall take advantage of favorable planting conditions. If the Contractor is permitted to plant at other seasons, approved anti-transpirants shall be used. If planting is performed in the fall, anti-transpirants shall be used.

Bare-root plants shall be immediately planted or heeled-in in accordance with accepted horticultural practice. Heeled-in plants shall be maintained in a healthy condition until planted. At the close of the planting season, remaining heeled-in plants shall be lifted and planted in nursery rows. Balled and burlapped plants shall be protected from drying and freezing.

The area shall be graded and approved before planting locations are staked. Tree locations and the general layouts of plant areas for shrubs, vines and ground cover shall be marked out and staked by the Contractor. Planting shall not be started until the Engineer has approved the locations and layouts.

Planting areas for shrubs and vines shall be cultivated to a minimum depth of 4 in. (100 mm). Weeds and other vegetative growth, large clods, rocks, and other debris encountered in the cultivating work shall be removed and disposed of.

When excavating holes for planting, topsoil shall be kept separate from subsoil and shall be made loose and friable. Alkaline soil, gravel, stones, or other detrimental material encountered in the excavation shall be removed and wasted.

Before planting, the root system of bare-root plants shall be examined. Broken or damaged roots shall be cut off cleanly.

Bare-root plants shall have their roots spread out in a natural position and the prepared topsoil shall be carefully placed under and among them to fill all voids.

In removing plants from containers, care shall be taken to prevent disturbance of the root systems or earth therein. Plants grown in individual containers of peat or other decomposable material shall be planted without removing the plant from the container.

After planting is completed, the soil surface shall be cultivated to a depth of not less than 2 in. (50 mm).

Commercial fertilizer shall be incorporated uniformly in the surface of the soil around trees and shrubs in the amounts directed. The quantities to be used will be approximately 1 lb. (0.5 kg) per tree, and 0.5 lb. (0.25 kg) per shrub or vine.

Soil conditioner shall be mixed into the loose 6 in. (150 mm) of topsoil in the bottom of planting holes, but shall not be mixed with the soil to be used in backfilling. The quantities to be used will be approximately 1 CF (0.03 m^3) per tree, and 0.5 CF (0.015 m^3) per shrub or vine.

Mulching of planted areas shall be performed after all planting work in each area is complete and the ground is smooth and clean. Mulch shall be placed to a 3 in. (75 mm) depth over the entire shrub and vine areas and around trees as shown on the plans.

Mulch shall be removed from plants, structures, roadway areas and grassed areas not specified to be covered.

Select topsoil shall meet the requirements of Subsection 711.09; shall be made loose and friable; and shall be applied in accordance with the plans or as directed.

Trees, shrubs, vines and ground cover shall be watered during or immediately after planting. Watering shall be repeated as often as necessary until the work is accepted.

Water may be obtained without charge from state-owned or state-controlled water supply systems on the project, if such exist; otherwise water shall be obtained by the Contractor at no expense to the state.

Trees and shrubs shall be properly pruned before or after planting according to accepted horticultural practice. Cut surfaces 1 in. (25 mm) or more in diameter shall be painted within 48 hours with an approved tree wound dressing.

The Contractor shall assure the establishment of plantings by watering, cultivating, replacement of plants or mulch, and other work necessary to maintain the plants in a healthy condition, throughout the plant establishment period of one year or as designated in the special provisions. Planting areas shall be maintained free of weeds, grass, litter, and debris.

If the Contractor elects to use a herbicide to control weeds, it shall be the Contractor's responsibility to replace and maintain plants and lawn damaged by its use.

Until the work has been accepted, the Contractor shall keep the planting areas free from weeds, grass, litter, and debris.

At completion of the original planting, dead plants shall be removed and replaced. Plants which do not show normal growth, but which retain green leaves, stems, or buds may be left in place, subject to acceptance or rejection during the next planting season.

After the original planting the Engineer will periodically inspect the condition of plants and planting areas. The Engineer will notify the Contractor of apparent defects, faults and conditions, and dead plants discovered by the inspection. Correction of apparent defects, faults and conditions, and the removal and disposal of dead plants shall be completed within 10 days after notification.

Dead plants shall be replaced at the earliest possible time. If immediate replacement of dead or rejected plants is impossible due to seasonal conditions or the lack of specified plants, a marker shall be placed at the spot of replacement and replacement shall be made in the next planting season. Provided all other work has been completed, plant replacement may be considered to be justification for an extension of time.

In the event of infestation by insects or disease, plants shall be treated by effective remedial measures approved as good horticultural practice.

620.04 Method of Measurement. The quantity of plants to be paid for will be the number of accepted trees, shrubs, vines, or ground cover of the specified sizes and kinds. Select topsoil will be measured by the cubic yard (cubic meter). Mulch will be measured by the cubic yard or ton (cubic meter or metric ton). Fertilizer will be measured by the ton or cwt. (metric ton or kilogram). Soil conditioner shall be delivered bagged or balled, the manufacturer's certification of loose volume may be accepted for a basis of cubic yard (cubic meter) measurement.

620.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Select Topsoil	CY (m^3)
Mulch	CY or Ton (m^3 or t)
Planting Trees (Seedlings or Container)	Each

Planting Shrubs (Bare-root or Container) .....Each
Planting Vines (Bare-root or Container) .....Each
Planting (Ground Cover) .....Each
Fertilizer (Commercial) .....Ton or cwt. (t or kg)
Soil Conditioner .....CY (m^3)

Progress payments for plants will be made at 80 percent of the contract unit price at the completion of the original planting. The remaining 20 percent will be paid at the completion of the plant establishment period when defective plants have been replaced.

SECTION 621 - SEEDING

621.01 Description. This work shall consist of one or more of the following: seed bed preparation, fertilizing, seeding, soil amendments, mulch mixtures, mulching, mulch anchoring (mechanical or tackifiers), erosion blanket (liquid or solid) and watering on prescribed areas in accordance with these specifications, or as directed.

Seeding operations may be required in conjunction with Section 212 – Erosion and Sediment Control.

621.02 Description Materials. All materials used shall meet the requirements of the following Subsections of Section 700 – Materials:

Seed 711.05
Fertilizer (Commercial).....711.07
Mulch 711.10
Erosion Blankets.....711.11
Water.....711.12
Mulch Tackifier 711.16
Mulch plus Tackifier 711.17
Soil Amendments.....711.18
Mulch Mixture 711.19

621.03 Construction Requirements.

A. *General.* Drill seeding shall be used on all areas with slopes of 3:1 or flatter and where there is a not excessive rock, gravel, or hardpan soil. Unless otherwise specified, fertilizer, seed, and mulch shall be applied in separate operations, one

following the other in this order, except fertilizer may be applied with a fertilizer attachment at time of seeding or with water when watering is specified. Tillage and drilling shall be performed cross-slope (horizontal) and furrows shall remain open.

Seeding operations shall be as specified in the special provisions.

Seeding shall be performed during the season(s) designated in the special provisions except for seeding used as a temporary erosion and sediment control measure.

If seeding is performed during season(s) designated for seeding, no drill seeding operation shall be performed when soil is too wet or dry, frozen or otherwise untillable.

If seeding is the only remaining work to be done on the contract and a time frame for seeding is provided for in the special provisions, contract time for completion shall be considered the latest date shown for the seeding.

All hydro applications which involve seeding, fertilizing, soil amendments, mulch mixtures, mulching, mulch anchoring (tackifier), erosion blanket (liquid or solid) or combinations of, shall be performed with hydro-application equipment, equipped with appropriate pump (preferably centrifugal) and engine size, mechanical agitation and independent liquid bypass circulation capable of handling and applying a thick homogenous slurry.

B. *Seedbed Preparation.* Areas to be seeded shall be maintained reasonably free of weeds by mechanical means or application of appropriate chemicals until seeding time. All weeds shall be kept from going to seed.

Areas to be drill-seeded shall be cultivated to a minimum depth of 3 in. (75 mm) (3 in.). The soil shall be worked to obtain a surface that shall permit proper operation of drill seeding equipment.

Areas to be broadcast seeded shall be cultivated immediately prior to seeding at a minimum depth of 2 in. (50 mm) (2 in.) and shall be left in a rough condition, similar to that obtained by walking a cleated-crawler tractor up and down the slopes. Where slopes are benched or serrated, no additional preparation shall be required.

Constructed or excavated slopes 3:1 or flatter that includes topsoil application shall be roughened and serrated and/or cross-ripped horizontally to the slope, prior to placement of the topsoil. After topsoil has been spread, the surface shall be prepared for seeding as specified above.

On areas subject to severe erosion, the extent of seedbed preparation shall not exceed the area on which the entire seeding and mulching can be applied within a one-day operation. If conditions occur that prevent seeding in proper furrows (2 in. (50 mm)nch depth, according to size and dimension of seeds), or if the roughened condition is destroyed, the Contractor shall prepare the seedbed again.

C. *Fertilizing (Commercial).* The type and application rate of fertilizer shall be as specified. The fertilizer shall be applied by the most appropriate of the following methods:

1. Fertilizer drill
2. Broadcast
3. Water applied

Wherever physically possible, fertilizer shall be placed with the seed at time of drill seeding by use of a fertilizer attachment. Fertilizer may be broadcast (wet or dry) or drilled. Fertilizer may be applied with irrigation water as directed. When fertilizing established stands, fertilizer shall be applied when average noontime temperatures are 60°F (16°C) (60°F) or lower. Fertilizer shall be certified by authorized (or approved) agency and declared or certified as "noxious weed free" prior to acceptance. Product shall include inspection certificate from approved commercial or state laboratory or manufacturer's certification prior to acceptance.

D. *Seeding.* Unless otherwise provided, seed shall be furnished by the Sstate at no cost. The mix and rate of seeding shall be as designated.

Seed furnished by other companies or vendors shall be certified "noxious weed free" and inspected by the Engineer prior to seeding. Seed shall be certified by authorized (or approved) agency and shall include inspection certificate from approved commercial or state laboratory or company certification prior to acceptance. Seed shall be uniformly applied over the seeded area by the most

appropriate method (as determined by slope, soil and/or site conditions) using one of the following methods:

1. Drill seeding (double disc with agitator) - for slopes 3:1 or flatter.

2. Broadcast seeding.

    a. Hydro-seeder.

    b. Dry (whirlwind) - for embankment slopes or cutslopes as approved by the Engineer.

When mulch is not applied (or used) after drilling, seed shall be planted at the bottom of approximately 2 in. (50 mm) (2 in.) depth furrows (furrows set according to size and dimension of seed) shaped by the double disc openers. The speed and spring pressure shall be so regulated that not over ½ in. (12 mm) of soil covers the seed and the furrows are left open. Drag chains shall not be allowed.

When mulch is applied or used after drilling, seed shall be placed as shallow in the soil as possible and be well covered. Seeding shall not be done when wind interferes with seed placement as determined by the Engineer. Drill spacing shall not exceed 9 in. (230 mm). Legume seed shall be seeded through a separate box from the grass seed, with seed spouts out, or broadcast ahead of the drill. Native seeds in the mix shall be broadcast immediately ahead of the drill. Seed shall be thoroughly mixed before placing in the drill or seeder box.

If area to be seeded is not practical for drill seeding method, the seed may be broadcast by using a hydro-seeder or dry broadcast equipment. Seed, fertilizer, and/or mulch shall be applied in separate applications. Fertilizer shall not be mixed with the seed in the hydro-seeder. Seed shall be applied to the seeded area first followed by the fertilizer and/or mulch application second. Agitation of seed in hydro-seeder shall not exceed 30 minutes.

At no time shall trucks or equipment be driven on the area after seed is in place.

E. *Mulch, Mulch Anchoring, and Erosion Blanket.*

1. *Mulching*. The type of mulch and method of application shall be as specified. Mulch shall be certified by authorized (or approved) agency and declared "noxious weed free" prior to acceptance. Product shall include inspection certificate from approved commercial or state laboratory or manufacturer's certification prior to acceptance. Mulching shall not be performed when wind interferes with mulch placement. Straw, grass hay, wood fiber, soil amendments, mulch mixture, or any combination of these materials shall be applied as directed. All material applied to the ground shall allow for the absorption and percolation of moisture. Application rates shall be as follows:

   Straw or grass hay (air dry) .....2 Tons/Acre (4.5 t/ha)
   Wood fiber .....1 Ton/Acre (2.25 t/ha)
   Soil Amendments .....As stated in the special provisions

2. *Mulch Anchoring*. The method of mulch anchoring shall be as specified.

   a. Mechanical.

      Mechanical mulch anchoring shall be on slopes 3:1 or flatter. Mulch shall be anchored into the soil by use of a heavy disc with flat scalloped discs approximately ¼ in. (6 mm) thick, having dull edges and spaced no more than 9 in. (230 mm) apart. Anchoring shall be to a depth of at least 2 in. (50 mm) with no more than one pass of the equipment on the same surface.

      All mechanical anchoring shall be done horizontal to the slope.

   b. Tackifier.

      Mulch tackifiers shall be used on slopes 2:1 or steeper. Mulch shall be anchored using a tackifier. Tackifier shall be applied in accordance with the manufacturer's written instructions and applied at a rate for the material, soil types, conditions, and degree of slope.

      If applied separately, a method to differentiate between the tackifier and mulch material, by color or tracer material, shall be incorporated during tacking operations. Tacking shall not be done when wind interferes with tackifier placement.

3. *Erosion Blanket*. The solid blanket or liquid mixture may consist of either a pre-manufactured roll or a mixture sprayed upon the ground. The type of blanket shall be as specified or pre-approved prior to application. Erosion Blanket shall be certified by authorized (or approved) agency and declared (or certified as) "noxious weed free" prior to acceptance. Product shall include inspection certificate from approved commercial or state laboratory or manufacturer's certification prior to acceptance.

   Erosion blankets shall be installed in accordance with the manufacturer's recommendations or as directed.

   a. Rolls.

      The erosion blanket shall be placed with fibers in contact with the soil over the entire area covered. The blanket shall not be stretched taut. The blanket shall be anchored at joints, corners, and along the edges.

      Blankets on slopes shall be installed vertically to the slope. The blanket edge along the top of the slope and the ends of adjoining blankets on the slope shall be buried and anchored (as per manufacturer's recommendations or per the Department's current Erosion & Sediment Control Manual) to prevent slipping or displacement of the blanket. The sides of adjoining blankets shall be overlapped, in the direction of water flow.

      Blankets used in ditches or channels shall have a minimum width of 3 ft. (1 m) (3 ft.). Blankets shall be anchored and overlapped in an approved manner so water shall neither flow under nor displace the blanket. Adjoining blankets shall be overlapped in the direction of water flow or as recommended by the manufacturer.

   b. Liquid Mixture (Hydro applied erosion blanket).

      The mixture shall be nontoxic to animals, soil microorganisms, aquatic and plant life and not interfere with or impede seed germination or vegetative growth and establishment. The mixture, as well as mixing and applying the mixture, shall be in accordance with

the manufacturer's written instruction and applied at a rate for the soil type, roughness of surface, conditions and degree of slope.

F. *Watering.* The Contractor shall provide a temporary water delivery system by use of either sprinklers or trucks.

Water shall be applied by the acre unit (AU) (cubic meter) at the times directed. Pipe connections shall be kept tight to avoid leakage and washing. Sprinklers shall be maintained in proper working order. Should runoff begin, watering shall be stopped and the balance applied after earlier water has penetrated the soil. The standard application rate is 16,000 gallons/acre (150 m^3/ha) and constitutes the amount of water which shall saturate the soil to a depth of 4 inches (100 mm) under average conditions. A one acre unit constitutes an application of 0.5 inch (12 mm) of water which shall saturate the soil to a depth of 4 inches (100 mm)ches under average conditions.

Inspection of 4 in. (100 mm) (4 in.) depth of saturation shall be made by excavating to a depth of 4 in. (100 mm) (4 in.) and observing for wetness. It is intended that the locations of inspection for wetness shall be reasonable and not be on "slick spots" or in unrepresentative areas.

621.04 Method of Measurement. For determining areas, measurements taken at right angles to the roadway centerline shall be made by slope distances. Measurements parallel to the centerline shall be made horizontally.

Seedbed preparation will be measured by the acre (hectare) for areas which have received this work as specified in Subsection 621.03.

Seeding, mulching, mulch anchoring, soil amendment, mulch mixture, and fertilizing will be measured by the acre (hectare) for each time this work is performed. The Contractor shall provide weight measurements of the materials used to verify that appropriate rates were applied.

Mulch plus tackifier will be measured by the acre (hectare); or by the square yard (square meter) for each time this work is performed.

Erosion blankets complete and in place will be measured by the square yard (square meter).

Provide water delivery system complete and in place will be measured per lump sum.

Watering will be measured by the acre unit (cubic meter) An (acre unit (AU) is defined as that amount of water required to saturate an area of 1 acre to at least 4 inches in depth).

621.05 Basis of Payment. Payment for accepted work will be made as follows. Payment will be made on "plan quantities" as specified in Subsection 109.01.

Pay Item	Pay Unit
Seedbed Preparation	Ac (ha)
Seeding	Ac (ha)
Mulching	Ac (ha)
Mulch Anchoring (Mechanical)	Ac (ha)
Mulch Anchoring (Tackifier)	Ac (ha)
Soil Amendments	Ac (ha)
Mulch Mixture	Ac (ha)
Mulch plus Tackifier	SY (m^2) Ac (ha)
Erosion Blanket	SY (m^2)
Fertilizing	Ac (ha)
Provide Water Delivery System	Lump Sum
Watering	AU (m^3)

Weed control shall be the responsibility of the Contractor and shall be performed at no additional cost to the State.not be an extra cost. The method of weed control shall require prior approval from the Engineer.

SECTION 622 - PRE-CAST CONCRETE HEADGATES

622.01 Description. This work shall consist of furnishing and installing pre-cast concrete headgates in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

622.02 Materials. Materials shall meet the requirements of the plans and be approved.

622.03 Construction Requirements. The area occupied by the headgate shall be shaped to conform to the structure and to afford a firm and uniform bearing over

its entire area. The dike or ditch shall be backfilled and compacted around the structure to avoid undercutting or erosion.

622.04 Method of Measurement. The headgates will be measured by the unit complete in place, including one length of pipe in addition to the pipe cast in the headwall.

622.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
_____ Pre-cast Concrete Headgate	Each

No separate payment will be made for structure excavation, backfill, or compacting backfill.

SECTION 623 - CONCRETE SLOPE PAVING

623.01 Description. This work shall consist of constructing concrete slope paving around structures and on embankments as shown on the plans or as directed.

623.02 Materials. Materials for concrete slope paving shall meet the requirements of Section 502. Unless otherwise designated on the plans, the coarse aggregate for those portions of slope paving designated as “exposed aggregate” shall be size No. 5. Concrete for slope paving shall be Class 22 (15.0) concrete with 4 to 7 percent entrained air.

Where colored concrete is shown on the plans, colorants shall be those approved and a color panel shall be furnished for approval.

Where exposed aggregate slope paving is called for on the plans, the method of obtaining the finish and an exposed aggregate panel shall be submitted for approval.

Pre-formed-expansion joint fillers shall conform to AASHTO M 213. Sound cedar or redwood may be used unless specified types are called for on the plans.

623.03 Construction Requirements. Construction shall meet the requirements of Section 502 - Concrete, where applicable except as modified herein.

The area on which slope paving is to be placed shall be graded to the lines and grade as shown on the plans and compacted to 90 percent density in accordance with the requirements of Section 205 - Excavation and Embankment.

As soon as the desired exposed aggregate surface has been attained and washed, the concrete surface shall be cured in accordance with Section 502.

623.04 Method of Measurement. Concrete slope paving will be measured by the square yard (square meter) of finished surface in place, measured in the plane of the finished surface.

623.05 Basis of Payment. The accepted quantities of this item will be paid for at the contract unit price as listed below. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Concrete Slope Paving	SY (m^2)

SECTION 624 - RIPRAP

624.01 Description. The work for slope protection shall consist of furnishing and placing riprap protection of the type specified at the locations and in reasonably close conformity with the lines and dimensions shown on the plans or as established.

Riprap will be classified as loose riprap, hand placed riprap, sack riprap, and concrete stabilized riprap.

624.02 Materials. Material for riprap shall meet the requirements of the following Subsections:

Loose Riprap	703 and 711.04
Hand Placed Riprap	703 and 711.04
Sack Riprap	711.04
Concrete Stabilized Riprap	711.04

624.03 Construction Requirements. The toe trench for riprap shall be excavated below probable scour elevation or to the elevation shown on the plans. Where scour elevation cannot be determined and no elevation is shown on the plans,

the trench shall be excavated 2 ft. (600 mm) below channel grade. No stone shall be laid or concrete placed until the toe trench and slopes are approved.

A. *Loose Riprap.* Loose riprap shall be placed so the larger stones are in contact with each other and the voids filled with the finer materials, producing a well graded compact mass. The stone shall be placed on the slope in a manner to ensure the specified thickness in one operation. When placing, care shall be used to avoid disturbing underlying material. Placing in layers parallel to the slope shall not be permitted.

B. *Hand Placed Riprap.* The stones shall be laid by hand on prepared slopes to the thickness specified or directed. The riprap shall be started by placing a course of the largest stones in the toe trench. Each stone shall be so placed that it shall rest partly on the prepared slope and not completely on the stone below and shall be thoroughly tamped or driven into place. The exposed face of all hand placed riprap shall be made as smooth as the shape and size of the stones will permit, and shall not vary more than 3 in. (75 mm) from a plane surface on the required slope.

C. *Sack Riprap.* Sack riprap shall consist of approximately 0.026 CY (0.02 m^3) of Class 15 (10.5) concrete placed in approved burlap or cloth sacks deposited on the slope to be protected in accordance with plans or as directed.

The concrete shall be placed in the sacks in a uniform volume leaving sufficient room for tying the sacks. The sacks shall then be placed in longitudinal rows in the trench and on the slope. In placing the sacks on the slope, their outside faces shall be reasonably true to line and grade. The tied end of the sack shall be turned under and the sack firmly pressed into place. Joints shall be staggered in succeeding rows. Sack riprap shall not be placed in freezing weather. Work damaged by freezing shall be removed and replaced by the Contractor at the Contractor's expense. Concrete may be placed in sacks in a dry state and dampened in place.

D. *Concrete Stabilized Riprap.* Riprap shall be placed in accordance with 1 or 2 above, then covered with concrete.

The surface of the stones to be concreted shall be cleaned of adhering dirt and clay and then moistened prior to the placement of concrete. Concrete shall be placed on the rock surface by use of chutes, tubes, buckets, pneumatic

equipment, or any other approved method that will prevent segregation of the materials.

Immediately after placement, the concrete shall be spaded and rodded into the rock voids to the depth shown on the plans. After the concrete has been placed, the rocks shall be thoroughly brushed so that their top surfaces are exposed. The outer rocks shall be exposed 0.333 to 0.25 their diameter above the concrete surface. Upon completion, no workmen or equipment shall be allowed on the finished area for at least 24 hours or longer if ordered.

624.04 Method of Measurement. Loose riprap or hand placed riprap will be measured by the Ton or cubic yard (metric ton or cubic meter) of riprap.

Sack riprap will be measured by the cubic yard (cubic meter) of concrete. No separate payment will be made for placing or sacking.

Concrete for stabilized riprap will be measured by the cubic yard (cubic meter) for the concrete placed.

Excavation of toe trenches below the level of the intersection of the slope to be riprapped and the adjacent final ground or channel floor shall be classified, measured and paid for as "structural excavation," in accordance with Section 210 - Structure Excavation and Compacting Backfill. All preparation of the slope to receive riprap above the level of the above described intersection shall be included in the contract price for the class of riprap to be placed.

624.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Loose Riprap	Ton or CY (t or m^3)
Hand Placed Riprap	Ton or CY (t or m^3)
Sack Riprap	CY (m^3)
Concrete for Stabilized Riprap	CY (m^3)

SECTION 625 - JOINTS

625.01 Description. This work shall consist of furnishing and placing joint material in accordance with these specifications and in reasonably close conformity with the plans or as directed.

625.02 Materials. Materials shall conform to the applicable Subsection of Section 700 - Materials.

Pre-formed Expansion Joint Filler.....704.01
Hot Poured Elastic Type Concrete Joint Sealer 704.02
Hot Poured Elastomeric Type Concrete Joint Sealer 704.03
Neoprene Compression Seal 704.04

625.03 Construction Requirements. Pre-formed expansion joint filler shall be placed accurately in the positions and to the lines and elevations shown on the plans. It shall be firmly anchored to the surface of the concrete on one side of the joint with 30d wire nails or 9 gage (4 mm) wire cast into the concrete.

Hot poured sealers shall be mixed and applied in accordance with the manufacturer's recommendations.

The joint shall be cleaned. Spalls or breaks shall be repaired properly prior to sealing. Neoprene compression seals shall be installed by first coating either the sealer or the sides of the joint, or both, with the adhesive lubricant. The sealer shall be pushed down so that it is not less than 1/4 in. (6 mm) and not more than 3/8 in. (10 mm) below the surface of the bridge deck at the edge of the joint, and 1/8 in. (3 mm) and not more than 1/4 in. (6 mm) below the surface of concrete pavement at the edge of the joint. After installation the joint material shall extend from edge to edge of the slab in one continuous length. The sealer shall not be stretched more than 8 percent during installation.

625.04 Method of Measurement. Not Specified.

625.05 Basis of Payment. Furnishing the material and doing the work prescribed under this item will not be paid for separately, but shall be considered as subsidiary work, and the cost thereof shall be included in the contract prices for the structure or pavement items.

SECTION 626 - CONSTRUCTION TRAFFIC CONTROL DEVICES

626.01 Description. This work shall consist of furnishing, erecting, maintaining and relocating necessary traffic control devices at locations prescribed in the contract or as directed.

All traffic control devices furnished by the Contractor shall remain the property of the Contractor and shall be removed from the project when no longer required. Those furnished by the state shall be returned to the state when no longer required on the project.

626.02 Materials. Material used in the construction of sign panels and other devices and their supporting structures will be left to the option of the Contractor provided the material is acceptable. All sign, barricade, drum and vertical panel colors except black shall be reflectorized. Reflectivity shall meet the requirements of Subsection 712.02.

Drums used for traffic control devices shall be constructed of plastic or other approved yielding materials. Metal drums are not acceptable for use as traffic control devices. The plastic or yielding drums shall be designed to limit rolling to a minimum if upset by outside forces. All drums shall have reflective markings on the bottom and top unless the base and top are designed to separate on impact. Sandbags or weights will not be allowed on top of drums.

Striping material shall be 4 in. (100 mm) wide, retro- reflective pressure sensitive tape manufactured for use as pavement striping, suitable for use on either concrete or asphalt surfaces. The tape shall be either white or yellow as specified. It shall have a pre-coated pressure- sensitive adhesive with no protective liner nor shall it require activation procedures. The striping materials shall be thin, flexible, formable and durable, and following application shall remain conformed to the texture of the pavement surface. The average thickness of material based on 5 micrometer readings of different locations shall not be less than 9 mils (0.23 mm).

The striping material shall be removable without requiring sandblasting, solvents, or grinding methods. It is not necessary to remove material between successive asphalt overlays.

Temporary flexible raised pavement markers shall be yellow body with yellow reflective tape on two sides and a protective cover or white body with white reflective tape on one side and a protective cover as specified. The marker body and cover shall be manufactured from a flexible polyurethane material with a factory applied adhesive on the marker base with release paper. The cover of the marker shall be attached to the vertical part of the marker in such a way that it will not come off because of traffic but can be easily removed manually. Reflective tape for the marker shall be metalized polycarbonate microprism retro-reflective material with acrylic

backing or equal. The tape shall have a minimum reflectance of 1800 candlepower/footcandle/SF (1800 candlepower/lux/m^2) at 0.1° observation and 0° entrance angles.

Portable Tubular markers used for traffic control devices shall be orange or fluorescent orange plastic or other approved yielding materials. Markers shall be a minimum height of 36 in. (910 mm) and have a minimum width of 3 in. (75 mm) when facing traffic. Markers shall have two each, 3 in. (75 mm) wide retro-reflective white horizontal bands placed a maximum of 2 in. (50 mm) from the top, with a minimum space of 2 in. (50 mm) and no more than 6 in. (150 mm) between the bands. The retro-reflective bands shall conform to Class B sheeting as specified in Subsection 712.02. Base shall weigh a minimum 15 lbs (6.8 kg).

626.03 Construction Requirements. Design and use of traffic control devices shall conform to the Manual on Uniform Traffic Control Devices, as adopted by the State.

Traffic control devices shall be required to demonstrate satisfactory field performance.

A device shall not be used for any purposes other than those for which it was intended.

All traffic control devices shall be either removed or covered when not necessary for the safety of project personnel or traveling public.

When initially manufactured, reflective sheeting shall have, at a minimum, the initial retro-reflectivity values specified in Subsection 712.02 Reflective Sheeting. Certified test reports from a responsible representative of the manufacturer may be required upon request from the Engineer.

Traffic control devices shall be maintained by immediately cleaning, servicing, or replacing any device that is missing, destroyed, damaged, inoperative, or when the retro-reflectivity is reduced to 75% for Class “A” or Class “B” sheeting, of the required initial retro-reflectivity.

Used signs, with the specified sheeting materials, legends, and colors, will be considered satisfactory if they meet the above retro-reflectivity requirements.

The Engineer may sample and test the materials at their point of manufacture, upon arrival at the project site, and/or at any point during the life of the project.

Any traffic control device which is found defective or is damaged shall be repaired or replaced at the Contractors expense.

Barricades and drums shall be provided with positive devices to prevent them from being blown over.

Temporary pavement marking tape shall be used to temporarily mark lane separation lines for traffic channelization. Temporary pavement marking tape shall be installed as soon as practicable and before nightfall, on all newly placed pavements, including leveling courses, scrub coats, asphalt treated bases, road mix pavements, and asphalt plant mix surface courses. Sections of temporary pavement marking tape 4 in. x 2 ft. (100 mm x 600 mm) shall be used and shall be installed at the same cycle length as detailed on the permanent marking plan. Half cycle lengths with a minimum of 4 in. x 2 ft. (100 mm x 600 mm) strips shall be used on roadways with severe curvature, or as directed.

During its period of use, the tape shall be maintained in its proper location and in an effective condition to serve the purpose for which it is intended.

Advance Warning Arrow Panels shall meet the requirements of the following table. Minimum legibility requirements are the distance at which the arrow panel message can be comprehended by a driver on a sunny day or a clear night.

TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM LEGIBILITY DISTANCE
A	24 in. x 47.24 in. (0.6 m x 1.2 m)	12	0.5 mi. (0.8 km)
B	29.53 in. x 55.12 in. (0.75 m x 1.4 m)	13	0.75 mi. (1.2 km)
C	47.2 in. x 94.49 in. (1.2 m x 2.4 m)	15	1.0 mi. (1.6 km)

The panels shall be of solid construction and be finished nonreflective black. The panels shall be mounted on a vehicle, trailer or other suitable support, with the bottom of the panel at least 6 ft. (2 m) above the roadway surface. Vehicle-mounted panels shall be provided with remote controls and appropriate self-contained power source. Advance warning arrow panels shall be provided with hour meters that record only actual hours of operation.

Advance warning arrow panels should have the following mode selections: (1) left or right flashing or sequential arrows; or (2) left or right sequential chevrons; and (3)

double flashing arrows; and (4) caution. The caution mode consists of four or more lamps arranged in a pattern which will not indicate a direction.

Advance warning arrow panels shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps should not be less than 25 nor more than 40 flashes per minute, minimum lamp on-time shall be 50 percent for the flashing arrow and 25 percent for the sequential arrow.

Temporary flexible raised pavement markers shall be used to temporarily mark lane separation lines on all pavement being used by traffic during seal coating operations. Markers shall not be applied more than 24 hours prior to seal coating operations and shall be placed on their own respective color of pavement markings. All seal coats that are followed with a fog coat shall require temporary flexible raised pavement markers to be double covered with a transparent covering over the retro-reflective portion of the marker. A single marker may be installed at the same cycle length as permanent marking to indicate proposed pavement marking locations if the roadway will be permanently marked prior to being opened to traffic. Half cycle lengths shall be used on roadways with severe curvature. Markers within a turn bay or painted median shall be placed at no more than 25 ft. (8 m) intervals including all angle points. Additional markers may be required and spacing varied as directed. All temporary flexible raised pavement markers used during a seal coat operation shall be placed, if the roadway is opened to traffic prior to placement of permanent pavement markings.

626.04 Method of Measurement. Construction signs will be measured by the square foot (square meter) of sign face. Barricades, drums, vertical panels, traffic control signal, and hazard identification beacon will be measured per each for each type and class, as set forth in the proposal. Type I Barricade shall be 6 to 8 ft. (1.8 to 2.4 m) in length. Type III Barricade shall be a minimum of 7 ft. (2 m) in length. Temporary pavement marking tape will be measured by the ft. of 4 in. (m of 100 mm) tape used, which price shall include placing the tape and removing when directed.

Rent Portable Tubular Markers will be measured per each.

Incidental Traffic Control Items will be measured on the lump sum basis, and shall include cones, flashers, steady burning lamps, delineators, traffic dividers, or other incidental traffic control devices not covered by other items.

Advance warning arrow panels will be measured by actual hours of operation as shown on the hour meter, which includes all operating costs and maintenance.

Traffic control maintenance will be measured by the man-hours authorized. Hours will be authorized for the work of relocating, cleaning, moving between projects on multiple project contracts, replacing damaged or stolen devices, and for maintaining traffic control devices. Hours will also be authorized for installing and removing State furnished guide and regulatory signs. As defined in 101.02, Traffic Control Devices shall include all devices whether rented, provided, or existing.

Temporary flexible raised pavement markers will be measured per each in place, which price shall include placing the marker, removing the cover, and removing the marker when directed. Any markers not in place prior to seal coating shall be replaced at no additional cost to the state.

626.05 Basis of Payment. When no bid items for Section 626 - Construction Traffic Control Devices, have been provided in the proposal, all costs of furnishing, installing, and maintaining such devices shall be included in the bid price for other items.

Payment for items for which a bid quantity is established shall be full compensation for furnishing, providing all mounting structures and hardware, and initially erecting or placing and final removal. Traffic control devices which are destroyed, damaged, or stolen will be replaced by the Contractor at no expense to the state other than payment for authorized traffic control maintenance to perform the replacement.

The accepted quantities of Traffic Control Maintenance will be paid for at the contract unit price bid for the man-hours authorized.

Signs, barricades, or other traffic control devices which have been approved for payment shall not be removed from the project until approved in writing.

Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Rent Construction Signs, Class ___	SF (m^2)
Rent Construction Barricade, Class ___ Type ___	Each
Rent Drums, Class ___	Each
Rent Incidental Traffic Control Item	Lump Sum

Rent Vertical Panels, Class ___ .....Each
Rent Advance Warning Arrow Panel, Type ___ .....Hour
Rent Traffic Control Signal .....Each
Rent Hazard Identification Beacon .....Each
Temporary Pavement Marking Tape (Yellow) .....ft. (m)
Temporary Pavement Marking Tape (White).....ft. (m)
Traffic Control Maintenance.....Man-Hour
Temporary Flexible Raised Pavement Marker .....Each
Rent Portable Tubular Markers .....Each

SECTION 627 - PAINTING

627.01 Description. This work shall consist of furnishing and applying paint in accordance with the manufacturer's recommendations and these specifications and in reasonably close conformity with the contract or as directed.

627.02 Materials. Materials shall conform to Section 707 - Paint.

627.03 Construction Requirements.

A. *General.* Paint shall be applied only on clean, dry surfaces. Painting will not be permitted when the ambient temperature is at or below 39°F (4°C). Painted surfaces shall be protected from damage until the paint has dried.

Painting shall be done in a neat and workmanlike manner. The application shall be free of runs, sags, skips and other defects. A succeeding coat may be applied only when the previous coat is dry and clean.

Rollers, when used, shall be of a type which do not leave a stippled texture in the paint film.

A water trap is required on all equipment used in spray painting.

Mechanical mixers shall be used to mix paint. Paint shall be kept thoroughly mixed to keep the pigments in suspension during its application.

Surfaces exposed to the atmosphere and which would be inaccessible for painting after erection shall be painted the full number of coats prior to erection.

Thinning of paint shall be done in accordance with the manufacturer's recommendations.

B. *Surface Preparation, Steel.*

1. *General.* Surface of steel to be painted shall be thoroughly cleaned, removing rust, mill scale, dirt, oil or grease, and other foreign substances. Unless otherwise provided, all new steel structure surfaces to be painted are to be blast cleaned, including steel piling. Existing structures are to be cleaned as described in the special provisions.

2. *Blast Cleaning.* Blast cleaning shall be in compliance with Subsection 2.14.3(A) of AASHTO Standard Specifications for Highway Bridges and result in a "Near White" finish as specified in Steel Structures Painting Council Specification SSPC-10. The "Near White" surface is shown in the pictorial standards of SSPC- Guide to Vis 1, A Sa 2.5, B Sa 2.5 and C Sa 2.5.

   When blast cleaning is being performed on structures open to traffic, the Contractor shall provide suitable protective devices to prevent damage to traffic.

   Blasted surfaces shall be primed or treated the same day cleaning is done unless otherwise authorized. If cleaned surfaces rust before painting is accomplished, they shall be re-cleaned.

3. *Steam Cleaning.* All dirt, grease, or other foreign material which has accumulated on the steel surfaces shall be removed with a steam cleaning. The steam cleaning shall precede all other phases of cleaning to remove grease or oil. Subsequent painting shall not be performed until the cleaned surfaces are thoroughly dry. Any paint which loses its bond with the preceding coat or coats after steam cleaning shall be removed to sound paint or metal surfaces and repainted.

   A detergent shall be added to the feed water of the steam generator. The detergent shall be of such composition and shall be added in such quantity that the cleaning as provided in the above paragraph is accomplished.

Any residue which may accumulate on clean surfaces shall be removed by flushing with fresh water.

4. *Hand Cleaning.* Wire brushes, either hand or powered, hand scraping tools, or sandpaper shall be used to remove all dirt, loose rust, mill scale, or paint which is not firmly bonded to the metal surfaces. The use of pneumatic chipping hammers will not be allowed without written authorization.

C. *Painting Structural Steel.*

1. *Paint.* Unless otherwise provided, all new main members and their bracing members and appurtenances exposed to view in the completed structure, superstructure and substructure shall be painted with shop prime coat(s), intermediate field coat and final field coat(s) of paint, using Paint Systems No. A oil base or No. B zinc base.

No. A Paint System, Oil Base

Primer - Shop prime coat(s)-Formula No. 1: color-Reddish Brown
Intermediate - Field coat-Formula No. 2: color-dark Reddish Brown
Topcoat - Final field coat(s)-Formula No. 7: color-Forest Green.

No. B Paint System, Zinc Rich

Primer - shop prime coat(s)-Formula No. 14: Zinc Rich,
Intermediate - Field coat-Formula No. 3: color Green,
Topcoat - final field coat(s)-Formula No. 7: color-Forest Green.

No. C Paint System, Zinc Rich Formula 14 (only)

Unless otherwise specified, 2.0 mils (0.05 mm) dry film thickness of Formula No. 14 shall be applied to steel below water.

Special Requirements for Paint Systems A and B.

Application of shop prime coat(s) shall result in a minimum of 2.0 mils (0.05 mm) and a maximum of 4.0 mils (0.10 mm) dry film thickness. Field coats shall result in a total system dry paint film thickness of not less than 5.0 mils (0.13 mm). Any thin spots or areas missed in application of any coat shall be repaired by the same paint formula to achieve the minimum thickness. Open seams at contact surfaces of built-up members which would retain

moisture shall be caulked with approved material before applying the second undercoat of paint.

Metal surfaces to be embedded in concrete shall not be painted.

Areas to be field welded and field contact surfaces not painted with the shop coat shall be given a coat of lacquer or other approved protective coating if it is expected there will be a prolonged period before erection. A suitable solvent shall be used to remove the protective coating before field welding or bolting.

Special Requirements for System B Utilizing Zinc Prime Coat Formula No. 14.

Zinc paints shall be applied by spray methods. On areas inaccessible to spray application, the paint may be applied by brush or daubers.

After mixing, the zinc paints shall be strained through a metal 30 to 60 mesh (0.6 mm to 0.3 mm) sieve or a double layer of cheesecloth immediately prior to or during pouring into spray pot.

Vinyl wash primer pretreatment, when applied over zinc coating, shall not be applied more than 48 hours before application of the finished coats of paint. Vinyl wash primer shall be applied at a 0.3 mils to 0.5 mils (0.008 mm to 0.013 mm) dry film thickness. Any mixed components over 8 hours old or that are scumming over and becoming difficult to apply smoothly shall not be used.

Any damaged areas on the Formula No. 14 zinc rich shop or prime coat whether damaged by cutting, drilling, welding, handling, or any other cause, shall be recleaned and recoated prior to applying the intermediate coat of Formula No. 3 Green Primer, Pretreatment Paint.

The intermediate coat of paint may be applied at the shop or any time prior to erection if desired; however, the final coat(s) are intended to be applied after erection.

2. *Prepriming of Steel.* Prepriming of steel components prior to welding which have been cleaned by grit, sand, or shot blasting prior to fabrication

will be allowed under Paint Systems No. B and No. C providing the height of profile of the anchor pattern produced on the surface shall be limited to a minimum of 1.0 mils (0.025 mm) and a maximum that will not be detrimental to the life of the paint film. The newly cleaned surface shall conform to SSPC-SP-10 "Near White" and shall be immediately primed with not less than 0.75 mils (0.020 mm) nor more than 1.0 mils (0.025 mm) thickness of Formula No. 14.

Upon completion of fabrication the steel must be cleaned on the welded or damaged areas to a "Near White" condition immediately prior to applying a 2.0 mils (0.05 mm) minimum dry thickness of prime coat. The entire preprimed area must then be brought to a minimum of 2.0 mils (0.05 mm) dry thickness.

The intermediate coat of paint may be applied at the shop or any time prior to erection if desired; however, the final coat(s) is intended to be applied after erection.

D. *Painting Wood.*

1. *Paint.* New wood requiring painting shall be painted with three coats of paint. The paint used for various coats will be shown on the plans or in the special provisions. For wood previously painted, the number of coats and types of paint will be specified in the special provisions.

2. *Preparation of Surfaces.* All cracked or peeled paint, loose chalky paint, dirt and other foreign material shall be removed by wire brushing, scraping, or other means immediately prior to painting.

3. *Painting.* After the first coat has dried, all cracks, checks, nail holes, or other depressions shall be puttied flush with the surface and allowed to dry before the second coat is applied. The surface of the coat being covered shall be free of any detrimental material before any additional paint is applied.

E. *Painting Concrete.* If painting is required, it will be noted in the Special Provisions or on the plans and will specify color and either Formula 12 or Formula 13.

1. *Paint.* All exposed surfaces of bridges shall be painted except:

   Top surface of the deck.

   Top surface of sidewalks and inner-face of sidewalks.

   Under surface of deck slabs between girders and interior girder faces.

   Surfaces below a line 1 ft. (300 mm) below finished ground.

2. *Preparation of Surfaces.* All surfaces to be painted shall receive an ordinary surface finish in accordance with Subsection 502.03. Upon acceptance of the concrete finish, the concrete shall be cured under Subsection 502.03.

   The paint may be applied over surfaces cured by methods A, C, D or System 3, Method B, described under Subsection 502.03. Resin, wax or other curing methods which are not compatible with the paint system will not be allowed. Formula 12, Elastomeric Vapor Barrier, may be applied to damp, uncured concrete surfaces as a one-coat cure and paint coating in lieu of curing by other approved methods.

   Surfaces to be painted shall be clean, dry, free from frost or any foreign substances, such as form release agents, dirt, laitance, oil or grease.

3. *Painting.* After the curing period with rubber base curing compound or with water, the concrete surface shall dry for a minimum of 48 hours. No painting will be permitted when concrete surface temperatures are below 39°F (4°C) or when relative humidity is above 85 percent.

   a. Formula 13, Acrylic Emulsion Paint shall be applied in two coats at a rate of 1 gal. per 300 SF (1 L/7.4 m^2) of surface per coat.

   b. Formula No. 12, Elastomeric Vapor Barrier paint shall be applied in 2 separate coats at a minimum rate of 1 gal per 200 SF (1 L/5 m^2) per each coat. The second coat shall be applied in a direction perpendicular to the first coat. Allow first coat to dry thoroughly before applying the second coat. The paint shall be applied using airless or

conventional spray equipment. The paint shall be a single package, pigmented, weather resistant, petroleum base material.

627.04 Method of Measurement. Not Specified.

627.05 Basis of Payment. Unless otherwise provided, painting will not be measured and paid for separately, but shall be considered as subsidiary work and the cost thereof included in the contract unit prices for related items.

SECTION 628 - SNOW POLES

628.01 Description. This work shall consist of furnishing and installing snow poles in accordance with these specifications, and in reasonably close conformity with the locations shown on the plans or as directed.

628.02 Materials. Materials shall meet the requirements of the following Subsections of Section 700 – Materials:

Rigid Posts for Delineators, Snow Poles, and Mileposts or Kilometer Posts.....708.16
Reflector Units for Delineators 712.04
Flexible Snow Poles 712.11

628.03 Construction Requirements. Snow Poles shall be as shown by type on the project plans or as specified. Snow poles shall be erected plumb.

All existing snow poles to be replaced with new installations shall be removed and shall become the property of the contractor.

A. Rigid Snow Poles. Rigid snow poles shall be installed to the height shown in the plans.

If posts are driven, an approved metal driving cap which fits snugly around the post shall be used. A minor amount of bending and twisting to align the posts may be permitted.

Delineator reflector units shall not be attached until the installation of the posts is complete.

B. Flexible Snow Poles. Flexible snow poles shall be installed according to ITD Standard Drawing G-3-B.

Snow poles shall be the same manufacturer brand and style throughout the project unless otherwise specified and approved.

628.04 Method of Measurement. Snow poles will be measured by the number installed complete in place. No separate payment will be made for a delineator installation when installing a rigid snow pole.

628.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Snow Poles, Type _____	Each

SECTION 629 - MOBILIZATION

629.01 Description. Mobilization shall consist of preparatory work and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of offices, buildings and other facilities necessary for work on the project; for premiums on bond and insurance for the project; and for all other work and operations which must be performed or costs incurred before beginning production work on the various contract items. Mobilization cost for subcontracted work will be considered to be included in the contract unit price bid for Mobilization by the prime Contractor.

629.02 Materials. Not Specified.

629.03 Construction Requirements. Not Specified.

629.04 Method of Measurement. Not Specified.

629.05 Basis of Payment. Payment for mobilization will be made at the contract unit price per lump sum for mobilization.

Payment for accepted work will be made as follows:

1. Sixty percent (60%) of the contract unit price or 6 percent of the total contract amount, whichever is less, will be paid on the first monthly progress estimate.

2. Forty percent (40%) of the contract unit price or four percent (4%) of the total contract amount, whichever is less, will be paid on the second monthly progress estimate providing that productive work on the project has been initiated by the Contractor.

3. Upon completion of all work on the project, payment of any amount bid for mobilization in excess of 10 percent of the total original contract amount will be paid.

Total contract amount is defined as the original total of all bid items plus the cost of items paid for at invoice estimated by the Department as shown on the original bid schedule.

Pay Item	**Pay Unit**
Mobilization	Lump Sum

SECTION 630 - FLAGGING AND PILOT CARS

630.01 Description. This work shall consist of furnishing flag persons and pilot cars with operators to lead and control traffic through the project at such locations as required or as directed.

630.02 Materials. Not Specified.

630.03 Construction Requirements. All flagging shall be performed by trained flag persons. Flaggers shall complete an ITD approved flagging course and carry the certificate of training on their person. Certificates of course completion are valid for a period of 3 years from date of issue, and then must be renewed. Certain surrounding states have a reciprocity agreement with ITD and those certificates will also be accepted for 3 years from date of issue.

All flaggers are required to wear high visibility clothing (vest, shirt or jacket) and a hard hat or soft cap. Color may be yellow, strong yellow-green, orange, or fluorescent versions of these colors. The hard hat is required when working in areas where there is a possible danger of head injury from impact, or from falling or flying objects, or from electrical shock and burns. The color of the hard hat or soft cap shall be the same as

the vest, shirt or jacket color and shall be uniform throughout the Contractor's personnel.

The Contractor shall provide for mid-morning, mid-afternoon and lunch breaks for flagging personnel. The lunch break shall be no less than one-half hour.

Pilot cars shall be operated in such a manner as to safely conduct traffic over or around portions of the highway under construction. The cars shall be identified by at least one roof- mounted high intensity rotating or strobe-type amber flasher that is readily visible from front and rear from 0.5 mi. (0.8 km). The amber flasher may be supplemented with orange flags appropriately placed on the vehicle. Pilot cars shall be equipped with the sign designated G20-4 in the Uniform Manual of Traffic Control Devices. It shall be mounted in a conspicuous position so that the bottom edge of the sign is at least 6 ft. (2 m) above the ground.

630.04 Method of Measurement. Flagging shall be measured by the hour of authorized paddle time. Pilot car operation shall be measured by the hour of authorized vehicle operation fully operated.

630.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Flagging	Hour
Pilot Car Operation	Hour

No separate payment will be made for show up time, stand by time or relief personnel for flagging and pilot car operation, or provision of restroom facilities. These costs shall be considered subsidiary and the cost thereof included in the contract unit price for flagging and pilot car operation.

Flagging for the sole convenience of the Contractor may be prohibited. If allowed, it will not be paid for.

SECTION 631 - CONSTRUCTION MAINTENANCE DURING WINTER SUSPENSION

631.01 Description. This work shall consist of furnishing labor and equipment necessary to maintain the roadways used by traffic during periods of suspension in a safe and reasonably smooth condition.

631.02 Materials. Not Specified.

631.03 Construction Requirements. Prior to suspension the Engineer will advise the Contractor of the level of maintenance that will be required on the roadways during suspension. Agreement will be reached, to the extent possible, on the manpower, equipment and material necessary to attain that level of maintenance.

631.04 Method of Measurement. Maintenance during suspension will be measured by the hour for labor and equipment used in performing maintenance operations. Equipment rental time will be measured only for the time spent in actual maintenance operations. No standby time will be allowed. This work shall be adjusted weekly upon duplicate report sheets furnished by the Engineer and signed by both parties, which weekly reports shall thereafter be considered a true record of the work done.

631.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Construction Maintenance During Winter Suspension	Contingency Amount

Labor will be paid for at the actual loaded cost to the Contractor. Equipment used in maintenance shall be paid for at 80 percent of the hourly rate without operator calculated in accordance with Subsection 109.03, Part 4b. A minimum payment equivalent to 100 percent of the owner's equity rate will be paid per month.

SECTION 632 - REMOVAL OF BRIDGE DECK CONCRETE

632.01 Description. This work shall consist of furnishing labor and equipment necessary to remove defective and/or contaminated concrete from the upper portions of bridge decks to the limits shown on the plans or as directed by the Engineer. It does not include any full depth deck removal except as may be required as Class B, or surface preparation beyond that which is incidental to the normal removal process. Upon completion of any class of removal, the Engineer will inspect the deck to determine need for further removal.

Bridge drains shall be temporarily plugged by approved means to prevent waste materials resulting from deck preparation and concrete placement from entering the

drainage systems. Expansion joints and barrier curbs shall be protected by approved means from damage due to construction operations.

Class A removal shall consist of removal of all concrete from the top surface of the deck over the area shown on plans to the mean depth limits shown on the plans. Concrete removal shall be accomplished by hydrodemolition or mechanical means after any seal coat has been removed. If the hydrodemolition removal extends beyond the mean removal depth where unsound concrete is encountered, it shall still be considered as Class A removal and shall not be considered as any additional work or cost to the State. Any concrete not removed to specified limits during hydrodemolition shall be removed by mechanical means. If less than an entire continuous slab is to undergo Class A removal, the line separating the section where removal is required and the section where removal is not required shall be saw-cut, prior to removal of concrete, to a depth approximately 75 percent of the planned removal depth.

Class B removal shall consist of removal of concrete after completion of Class A removal and shall be as directed by the Engineer.

632.02 Materials. None specified.

632.03 Construction Requirements.

Class A Removal

A. *Mechanical Removal.* Mechanical removal shall be by power operated diamond grinding machinery, or by the use of jackhammers having a nominal rating of not more than 30 lb. (135 N) and held at an angle not exceeding 45° from the surface of the slab. If any reinforcing steel is exposed in the course of this class of removal, the Contractor shall immediately stop work and request instructions of the Engineer.

B. *Hydrodemolition Removal*

1. Concrete Removal: A trial area will be designated by the Engineer to demonstrate that the equipment, personnel and methods of operation are capable of producing results satisfactory to the Engineer. Necessary parameters will be set for the removal of the concrete. Upon acceptance of the results of the trial area, work will begin.

All exposed steel must be completely cleaned of rust, scale and corrosion. Reinforcing steel that is damaged or broken will be repaired at no additional cost to the State. The repair procedure shall be approved prior to the start of work.

2. Equipment: The hydrodemolition equipment shall be a self-propelled machine that utilizes a high pressure water jet stream capable of removing concrete to the depth specified on the plans and be capable of removing rust and concrete particles from reinforcing steel. Hand held high-pressure wands or 30 lb. (135 N) maximum jackhammers operated at no more than a 45° angle from horizontal shall be used in areas that are inaccessible to the self-propelled machine.

   The Contractor will have available on the site during the start-up of hydrodemolition, a qualified full-time representative of the manufacturer of the hydrodemolition equipment until the removal operation is progressing to the satisfaction of the Engineer. The manufacturer's representative will be a full-time employee of the hydrodemolition equipment manufacturer, and shall remain available on the job site within 24 hours of notice by the Engineer at all times during the removal operation. Recommendations made by the manufacturer's representative, on or off the job site, and approved by the Engineer shall be adhered to by the Contractor at no additional cost to the State.

   The Contractor shall provide documentation that equipment is operated by qualified personnel trained by the manufacturer of the equipment. The Contractor must provide sufficient spare parts and service to maintain the operation of the equipment.

   The Contractor shall provide shielding, as necessary, to insure containment of all dislodged material within the removal area in order to protect the public from flying debris both on and under the work site.

3. Runoff: All runoff water or residual material shall be collected within existing roadway slopes and disposed of by land application off site. Any temporary collection ponds will be lined with a separation geotextile. In no case shall runoff water or residual material be allowed to flow into the vehicular and pedestrian traffic areas and into nearby waterways. The

Contractor shall be responsible for obtaining any permit required and complying with applicable regulations concerning the water disposal.

4. Cleaning: Cleaning shall be performed with a vacuum system capable of removing wet debris and water all in the same pass, or other approved method. The deck shall then be blown dry with air to remove excess debris and water. Cleaning shall be done in a timely manner, before debris and water are allowed to dry on the surface. Any exposed reinforcing steel that is left unsupported by the hydrodemolition process shall be adequately supported and protected from all construction operations. Handling of any water runoff will be as designated above in 'Hydrodemolition Runoff'.

Class B Removal

After the Class A removal has been completed the Engineer will resound or chain the deck to assure that all unsound material has been removed.

Additional removal, designated as Class B, shall be performed with the hand held hydro-wand, or 30 lb. (135 N) maximum jackhammer operated at an angle of no more than 45 degrees from horizontal, or by the use of hand tools. If the bond between concrete and reinforcing steel has been destroyed, the adjacent concrete shall be removed to a depth that will provide a minimum 3/4 in. (19 mm) clearance around the steel.

Cleaning shall be done in a timely manner, before debris and water is allowed to dry on the surface. All exposed reinforcing steel that is left unsupported shall be adequately supported and protected from all construction operations.

As with Class A Removal, control of all debris and wash residual shall be exercised so as to protect all areas below the bridge, and as directed.

632.04 Method of Measurement. Concrete removal Class A and Class B shall be measured by the square yard (square meter) of deck removal area shown on the plans.

632.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Concrete Bridge Deck Removal Class A	SY (m^2)
Concrete Bridge Deck Removal Class B	SY (m^2)

SECTION 634 - MAILBOX

634.01 Description. This work shall consist of removing the existing mailbox with stand, furnishing, and installing mailbox and support/foundation in accordance with these specifications at the locations shown on the plans or as directed.

634.02 Materials. Mailbox shall be Postmaster General approved.

Type I support/foundation shall meet the requirements of Subsection 708.16.

The platform, adapter plate, bracket, nuts, screws, washers, and miscellaneous hardware shall be galvanized as noted on the plans.

634.03 Construction Requirements. The existing mailbox and stand shall be removed and returned to the owner. A new mailbox, the size as shown on the plans, shall be furnished and installed on a support/foundation. The mailbox and support/foundation shall be installed at the locations shown on the plans or as directed.

Name and address as shown on the existing mailbox shall be placed on the new mailbox.

Support/foundation shall be installed in relation to the direction of traffic as shown on the plans. The support/foundation shall be driven plumb during installation with the finished installation plumb to the ground.

Mail service shall not be disrupted. Access to mailbox shall be provided at all times. An acceptable temporary mailbox stand may be installed by the Contractor during construction operations prior to the installation of the new mailbox and support/foundation.

634.04 Method of Measurement. Mailbox will be measured by each mailbox installed, regardless of support/foundation assembly (single or multiple), or size of mailbox. All support/foundations, platforms, adaptor plates, brackets, and other hardware required for a completed installation shall be incidental to the item.

The number and size of mailbox and type of support/foundation shall be verified prior to ordering.

634.05 Basis of Payment. Payment for accepted work shall be as follows:

Pay Item	Pay Unit
Mailbox	Each

SECTION 635 - ANTI-SKID

635.01 Description. This work shall consist of furnishing and placing anti-skid of the type specified in stockpiles at designated locations.

635.02 Materials. Anti-skid material shall meet the applicable requirements of Section 703 - Aggregates. The aggregate shall be accepted at the crushing plant.

635.03 Construction Requirements. The stockpile site shall be prepared by clearing and smoothing as directed. Stockpiles shall be neat and regular in form and shall occupy as small an area as possible.

635.04 Method of Measurement. Anti-skid will be measured by the ton or cubic yard (metric ton or cubic meter).

635.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Anti-skid Type____	Ton or CY (t or m^3)

SECTION 640 – CONSTRUCTION GEOTEXTILES

640.01 Description. This work shall consist of furnishing and installing a geotextile in accordance with these specifications and in reasonably close conformity to the details shown on the plans or as directed by the Engineer.

640.02 Materials. Geotextiles and seams shall meet the applicable requirements of Section 718-Geotextiles.

640.03 Construction Requirements.

A. *Shipment and Storage.* During periods of shipment and storage, the geotextile shall be placed in a dry place off the ground and protected from damage and shall be maintained in an opaque, heavy-duty protective covering.

B. *Placement.* The area to be covered shall be graded to a smooth, uniform condition free of obstructions, depressions, and debris. The geotextile shall be spread immediately ahead of the covering operation. The geotextile shall not be dragged on the ground or mishandled in any way. The geotextile shall be placed loosely and without wrinkles so that placement of the overlying material will not tear the geotextile. The geotextile shall be lapped or sewn, as specified, at the ends and sides of adjoining sheets. The cover material shall be placed on the geotextile in such a manner that a minimum of 6 in. (150 mm) to 18 in. (450 mm) of material, depending on the survivability of the geotextile and the weight of the construction equipment, will be between the vehicle or equipment tires or tracks and the geotextile at all times.

The geotextile shall be covered with the specified cover material as soon as possible. Geotextiles which have not been ultraviolet stabilized shall not remain uncovered for longer than 7 days. Ultraviolet stabilized materials shall not remain exposed longer than 30 days.

C. *Soft Ground.* Where Geotextiles will be placed over soft ground, construction vehicles shall be limited in size and weight such that rutting in the initial lift above the geotextile is not greater than 3 in. (75 mm) deep. Turning of vehicles on the first lift above the geotextile will not be permitted. End-dumping the cover material directly on the geotextile will not be permitted. Compaction of the first lift above the geotextile over soft ground shall be limited to routing of placing and spreading equipment only. No sheep-foot type equipment will be allowed on the first lift. Subsequent lifts will be closely observed during compaction. If any foundation failures occur during compaction operations, lightweight compaction equipment shall be used. Pegs, pins, or the manufacturer's recommended method shall be used as needed to hold the geotextile in place until the specified cover material is placed. Under no circumstances shall cover material be dropped on unprotected geotextile from a height greater than 3 ft. (1 m) above the surface of the geotextile.

D. *Seams.* Sewn seams will not be required unless specified in the special provisions or shown on the plans. Seams shall consist of two parallel rows of stitching. The two rows of stitching shall be 1/2 in. (12 mm) apart with a tolerance of 1/4 in. (6 mm) and shall not cross, except for restitching. The stitching shall be a lock-type stitch. The minimum seam allowance, i.e., the minimum distance from the geotextile edge to the stitch line nearest to that edge, shall be 1.5 in. (37 mm) if a flat or prayer seam is used. The minimum

seam allowance for all other seam types shall be 1 in. (25 mm). The seam, stitch type, and the equipment used to perform the stitching shall be as approved. Unless other wise specified the Contractor shall use a "J" seam with two passes of a lock-type stitch with at least 3 stitches per 1 in. (25 mm). The prayer seam (flat) may be used for repair of damaged in-place geotextiles.

The seams shall be sewn with high strength polyolephin, polyester orf kevlar thread and shall be as resistant to deterioration as the geotextile being sewn. The thread shall be of a color which contrasts that of the geotextile.contrasting color than the geotextile. Nylon threads will not be allowed. The strength of the seam shall be at least 90% of the minimum required tensile strength for the intended application as specified in Subsections 718.05 through 718.09. The Engineer's approval will be required prior to the Contractor's production field stitching/seaming.

E. *Repairs.* Should the geotextile be torn, punctured or the overlaps or sewn joints disturbed, as evidenced by visible geotextile damage, subgrade pumping, intrusion, or roadbed distortion, the backfill around the damaged or displaced area shall be removed and the damaged geotextile repaired or replaced by the Ccontractor at no cost to the State. The repair shall consist of a patch of the same type geotextile placed over the damaged area. The patch shall overlap the existing geotextiles a minimum of 2 ft. (600 mm) from the edge of the damaged area, except for pavement overlay geotextiles. Patching of overlay geotextiles shall be as specified in Subsection 640.03, Part I. Where geotextile seams are required to be sewn, any damaged sheets shall be repaired by sewing, unless otherwise indicated. Seams shall be sewn as specified in Subsection 640.03, Part D.

F. *Underground Drainage.* Underdrains shall be constructed in accordance with the details shown on the plans. The geotextile shall be placed to conform loosely to the shape of the trench.

The geotextile shall either be overlapped a minimum of 12 in. (300 m) at all longitudinal and transverse joints, or the geotextile joints shall be sewn. In trenches less than 12 in. (300 m) wide, overlap shall be the width of the trench. Trench installations shall be considered protected if trench walls are relatively smooth and stable and trenches are less than 10 ft. (3 m) deep and free of sharp projections. Other conditions shall be considered unprotected.

Drainage geotextiles placed under or over a horizontal or sloping surface such as on a subgrade or in conjunction with drain blankets shall meet the construction survivability requirements of subgrade separation geotextiles, as recommended by the manufacturer.

G. *Riprap/Erosion Control.* Geotextiles under riprap and rock buttresses shall be constructed in accordance with the details shown on the plans and the following. The geotextile shall either be overlapped a minimum of 2 ft. (600 mm) at all longitudinal and transverse joints, or the geotextile shall be sewn together at all joints at the time of manufacture to form geotextile widths as required. If overlapped, the geotextile shall be placed so that the upstream strip of geotextile will overlap the next downstream strip. Where placed on slopes, each strip shall overlap the next downhill strip.

The geotextile shall be keyed at the top and the toe of the slope as shown in the plans. The geotextile shall be secured to the slope, but shall be secured loosely enough so that the geotextile will not tear when the riprap is placed. The geotextile shall not be keyed at the top of the slope until the riprap is in place to the top of the slope.

Placement of aggregate, riprap or both on the geotextile shall start at the toe of the slope and proceed upwards. The Contractor shall demonstrate that the combination of the rock-fill drop height and the thickness of any aggregate cushion, are adequate so as not to puncture or damage the geotextile when placing the riprap or rock-fill. Where an aggregate cushion is required, it shall be a minimum 6 in. (150 mm) thick.

In addition, the following limits apply:

	Maximum Drop	**Height, ft. (m)**
Size of Riprap Material	Directly onto Construction Fabric	Onto Aggregate Cushion Blanket
Greater Than 200 lb. (100 kg) Rock	0	3 ft. (1 m)
200 lb. (100 kg) Rock or less	3 ft. (1 m)	5 ft. (1.5 m)

NOTE: A rock weighing 200 lb. (100 kg) will typically have a volume of approximately 1.3 CF (0.04 m^3).

After placement of the riprap, all voids in the riprap face that allow the fabric to be visible shall be satisfactorily back-filled so that the fabric is completely covered.

Grading of slopes after placement of the riprap will not be allowed if grading results in stone movement directly on the geotextile. Under no circumstances shall stones weighing more than 110 lb. (50 kg) be allowed to roll down slope. Stones shall not be dropped from a height of greater than 3 ft. (1 m) above the geotextile surface. Lower drop heights may be required if geotextile damage from the stones is evident, as determined by the Engineer. If the geotextile is placed on slopes steeper than 2:1 (H:V), the stones shall be placed on the slope without free-fall.

H. *Subgrade Separation*. The subgrade shall be prepared in accordance with Section 205.

The geotextile shall either be overlapped a minimum of 2 ft. (600 mm) at all longitudinal and transverse joints, or the seams shall be sewn to form geotextile widths as required. Installation shall conform to the requirements of Subsection 640.03.

I. *Pavement Overlays.* The use of geotextiles in pavement overlays involves four basic steps: initial surface preparation, application of a sealant, placement of the geotextile, and placement of the overlay.

1. Weather Limitations – The weather limitations for placement of sealant and geotextile shall conform to Sections 402 and 403, as appropriate, except minimum air temperature for paving grade asphalt sealant placement shall be at least 50°F (10°C).

2. Surface Preparation – The pavement surface on which the sealant is to be placed shall be prepared as prescribed in Subsection 401.03. In addition, cracks exceeding 1/8 in. (3 mm) width shall be cleaned and filled with suitable bituminous crack filler. Crack filling material shall be allowed to cure prior to geotextile placement. Leveling courses shall be placed prior to placing the geotextile.

3. Asphalt Sealant – Asphalt sealant shall be of the type and grade specified in the contract. The sealant material shall be spread by means of a

pressure distributor conforming to the requirements of Subsection 406.03. The asphalt sealant shall be uniformly spray-applied to the prepared dry pavement surface at the rate recommended by the geotextile manufacturer and approved by the Engineer. For paving grade asphalt cements the maximum distributor tank temperature shall not exceed 320°F (160°C) to avoid damage to the geotextile.

The width of the sealant application shall be the geotextile width plus 6 in. (150 mm). The sealant shall be applied only as far in advance of geotextile installation as is appropriate to ensure a tacky surface at the time of geotextile placement. The geotextile must be placed on the sealant while it is hot. Geotextiles shall be placed the same day as the sealant. Traffic shall not be allowed on the sealant.

4. Placement of Geotextile – The geotextile shall be protected from moisture at all times during storage and placement. The geotextile shall be placed using mechanical or manual laydown equipment capable of providing a smooth installation with a minimum amount of wrinkling or folding. Wrinkles or folds in excess of 1 in. (25 mm) shall be slit and laid flat. All transverse joints and slit folds or wrinkles shall be shingle-lapped in the direction of the paving operation. Overlap shall be sufficient to ensure closure but shall not exceed 6 in. (150 mm). Brooming and/or pneumatic rolling will be required to maximize geotextile contact with the pavement surface. Additional hand-placed sealant material may be required at laps. Traffic allowed on the placed geotextile shall be limited to necessary construction equipment and emergency vehicles, unless otherwise directed. Pavers and other vehicles shall be turned gradually and minimally to avoid movement and damage to the geotextile. Abrupt starts and stops shall also be avoided. Damaged geotextile shall be removed and replaced with the same type of geotextile, and the overlaps shall be shingle-lapped in the direction of paving.

5. Placement of Overlay – Overlay placement shall closely follow geotextile placement. Windrowing asphalt on the geotextile ahead of the paving marking machine will not be allowed.

640.04 Method of Measurement. Geotextiles will be measured to the nearest square yard (square meter) of surface area actually covered. No separate measurement will be made for construction of laps, seams, joints or patches, unless

the Engineer orders more than the specified lap, in which case the added lap width will be measured.

The number of square yards (square meters) of geotextile in drains will be computed by multiplying the length of the trench where geotextile is used by the perimeter as determined from the constructed typical section.

640.05 Basis of Payment. Payment for accepted for work will be made as follows:

Pay Item	Pay Unit
Drainage Geotextile	SY (m^2)
Riprap/Erosion Control Geotextile	SY (m^2)
Subgrade Separation Geotextile	SY (m^2)
Pavement Overlay Geotextile	SY (m^2)

Payment for the above items will comprise full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work specified under this Section.

If the Engineer orders geotextiles with properties more stringent than specified, price adjustments for difference in material cost only will be allowed.

656 - TRAFFIC SIGNAL INSTALLATION

656.01 Description. This item shall consist of furnishing and installing a traffic signal at the location or locations specified on the plans.

The Contractor shall install all electrical conduit, wiring, signal equipment, steel poles, pole foundations, and all other electrical equipment necessary for the construction of a complete traffic signal installation. All materials necessary for the complete installation shall be furnished by the Contractor with the exception of materials explicitly noted on the plans to be furnished by others.

The Contractor may utilize existing signalization equipment to aid in the control of traffic during construction. All existing signalization equipment shall be salvaged and removed in a neat, workmanlike manner and delivered to the state. Removal and salvage of this equipment will not be paid for separately, but shall be included in the cost of signalization under this item, along with any temporary signalization that may be required.

656.02 Materials. The following material shall meet the requirements specified in the listed Subsection of Section 700 - Materials.

Rigid Steel Conduit 713.03
Rigid Plastic Conduit 713.04
Concrete Junction Boxes 713.05
Composite Junction Boxes 713.06

Concrete shall conform to Section 502 - Concrete.

Other materials required to complete the installation shall meet the following requirements:

All electrical equipment and materials shall conform to the latest standard of the Underwriters' Laboratories, Inc. and to the National Electrical Manufacturers Association as appropriate. In addition to the requirements of the plans, specifications, and the special provisions, all material and workmanship shall conform to the National Electrical Code and shall meet all local codes and requirements of the connecting utility.

The Contractor shall submit for approval a list of all equipment and all materials proposed for installation. Each item listed shall include manufacturer's name, size, and catalog number.

Manufacturer's warranties, guarantees, instruction sheets and parts lists for materials used in the signal installation shall be turned over to the state upon completion of the project.

The Contractor shall submit shop drawings for approval before fabrication begins for the following items:

1. Steel signal poles (nonstandard poles only)*
2. Concrete junction boxes
3. Loop detector cabinets
4. Composite junction boxes

*NOTE: Nonstandard poles are defined as poles other than those conforming to the standard drawings.

Catalog numbers listed on the plans are only for the purpose of identifying material and equipment as to type and configurations required for use in the traffic signal installation.

Signal poles shall conform to the requirements of Subsection 708.19. Additional requirements are:

1. The signal mastarm shaft (gauge) thickness in in. (mm) shall be permanently shown on each mastarm near the attachment plate (nonstandard poles only).

2. All poles except pedestal poles shall have a 4 in. x 6.5 in. (100 mm x 165 mm) frame and cover located 90° to the right of the mastarm location.

3. Four steel anchor bolts of the manufacturer's recommended size shall be furnished with each pole. Each bolt shall be fitted with two nuts and a washer.

Vehicular signal heads shall be the adjustable, one-way type with the number of sections as shown on the plans and include the following:

1. Tunnel visors are required for each signal face, 8 in. (200 mm) for 8 in. (200 mm) lens, and 10 in. to 12 in. (250 mm to 300 mm) for 12 in. (300 m) lens.

2. Inside of visors shall be painted flat black.

3. The exterior of signal heads and tunnel visors shall be traffic signal green.

4. Reflectors shall be made of specular aluminum.

5. A terminal block shall be furnished and installed in the center section of the signal head. All lamp socket wires shall have terminal connectors and be fastened to the terminal block.

6. Signal backplates shall be finished in flat black.

7. Lamps shall be 125 volt, clear traffic signal lamps, with lumen rating and light center as specified by the Institute of Transportation Engineers.

8. Heavy duty lamp sockets shall be furnished with 12 in. (300 m) signal heads.

Pedestrian signal heads shall be one-way illuminated by incandescent traffic signal lamp contained in each section, or by modular neon with the addition of the following:

1. Tunnel or egg crate visors are required.

2. The inside of the visor shall be flat black.

3. The exterior of the signal heads and visors shall be traffic signal green.

4. Reflectors shall be specular aluminum, or approved alternate.

5. A terminal block shall be furnished and installed in the WALK section of the signal head. All lamp socket wires shall have terminal connectors and be fastened to the terminal block.

6. Incandescent lamps shall be 125 volt, clear traffic signal lamps, with lumen rating and light center length as specified by the Institute of Transportation Engineers.

7. Heavy duty lamp sockets shall be furnished with 12 in. (300 m) signal heads.

Optically programmed signal heads shall permit the visibility zone of the indication to be determined optically and require no hoods or louvers. The projected indication may be selectively visible or veiled anywhere within 15° of the optical axis. No indication shall result from external illumination nor shall one light unit illuminate a second.

The signal heads shall be the adjustable one-way type with the number of sections as shown on the plans.

Multiple overhead and underground signal cable shall be 600 volt, No.14 (1.6 mm) uncoated annealed stranded copper wire with polyethylene conductor insulation and polyethylene or polyvinyl chloride sheath. The number of conductors shall be as shown on the plans. The multiple conductor cable shall meet the requirements of Insulated Power Cable Engineers Association Publications S-61-402 or National Electrical Manufacturers Association current Publication WC5, Section 7.4, type B; or International Municipal Signal Association Specification No. 19-1, or No. 20-1, with the exception that Section 3.2 shall read uncoated annealed stranded copper wire, latest version.

The loop cable shall be No. 18 AWG stranded four (4) conductor, waterproof instrumentation cable. Color coding of the four conductors shall be in accordance with the published IPCEA - NEMA standards. The cable shall have a high density polyethylene jacket with a water blocking filler between conductors and be suitable for direct burial. The cable shall be equal to Canoga Controls 20002, Clifford of Vermont 4C18B7NS-F, Independent PDS-078506, or Atlas Wire and Cable Corp. A953.

The lead-in conductors from the loop to the controller cabinet shall be No. 18 AWG shielded wire with a polyethylene jacket. The cable shall be Clifford of Vermont 4C18 B7 OS-F or Canoga 30003.

Wire identification shall be a one-piece, pre-painted, tubular type marker and shall be of the required size for the size of conductors installed.

Traffic signal controller, cabinet and auxiliary equipment shall be of the type indicated on the plans or specified in the special provisions.

The cabinet wiring schematic and the application programming for the control equipment shall be submitted for approval before fabrication begins.

The controller, cabinet and all auxiliary equipment to be installed in the cabinet shall be submitted to the state for inspection for compliance to specification and operational testing prior to installation. This equipment shall be made available to the state for a period of not less than 30 days. Any component that does not comply with the specification or fails during these tests will be corrected by the Contractor prior to approval of the equipment by the state for installation on the project.

If the Contractor proposes to furnish control equipment other than the makes and models called for by the plans, the complete control equipment and cabinet assembly shall be furnished to the state for evaluation and testing for a period of at least 45 days. The state may accept or reject such alternates depending on the evaluation to determine if the proposed alternate equipment is equal to or better than that specified.

The equipment submitted for inspection and testing must be delivered to:

Idaho Transportation Department
Signal Shop
8150 Chinden Boulevard
Boise, Idaho 83714

The state will deliver the approved equipment only on its regular scheduled delivery to the appropriate district office. If other type of delivery is requested, it will be at the Contractor's expense.

656.03 Construction requirements. Construction of this item shall be in conformance with the plans, these specifications and Section 619 - Illumination:

Signal heads shall not be installed until all other signal equipment, including the controller, is in place and ready for operation at that intersection, unless the signal heads are completely covered.

All neutral wires shall be white. All wires shall be identified by attaching wire markers at all terminal points. Coding shall be according to the number shown in the field signal wiring diagram of the plans.

Powdered soapstone, talc, or other approved lubricants shall be used when inserting conductors in conduit. Before proceeding to pull cable in the underground conduit runs, the Contractor shall clean all dirt or accumulations of moisture from conduit runs.

The use of winches or other power actuated equipment not specifically designed for pulling wire will not be permitted.

All cable runs shall be continuous between the terminal blocks, as shown on the Field Signal Wiring Diagram. Splicing between terminal blocks will not be permitted except at locations that may be shown on the plans.

Wiring within controller cabinets shall be neatly arranged in bundles in a squared corner pattern and laced, or tye wrapped. A minimum of 4 ft. (1.2 m) of slack cable shall be provided in the cabinet base for each cable. Cable shielding shall remain in place except the last 4 in. (100 mm) measured from the termination of the shortest wire in each cable.

Approved connectors shall be used on all conductors at the terminal points.

The Contractor may use cable with more conductors than called for in the wiring diagram. Where this is done, the extra conductors shall be taped off and labeled as spares.

Optical programmed signals shall be installed, directed and veiled in accordance with published instructions of the manufacturer. Each section of the signal shall be masked with prescribed materials in acceptable and workmanlike manner.

The Contractor may be required to provide the assistance of a company representative of the equipment manufacturer on site for the purpose of directing and veiling in accordance with the visibility requirements.

Sawed slots for detector loops shall be positioned in the pavement in conformance with the plans. The slot shall be cut approximately 1/16 in. (2 mm) wider than the loop cable and shall be of sufficient depth to provide at least 1 in. (25 mm) of clearance over the top wire when located in the top pavement course, and 1/2 in. (12 mm) of clearance when located in the bottom course.

The corner of the slot must be cut on a diagonal or chamfered to prevent sharp bends of the cable. All sharp edges shall be removed that might damage the loop cable jacket. The slot shall be dried and all loose material removed prior to insertion of the loop wire.

Detector loops shall be the size indicated and installed in conformance with the plans.

One continuous length of cable shall be used from the junction box around the loop area and back to the junction box. Loop conductors shall be spliced in the junction box.

One turn is once around the saw slot with the same cable. Two turns are twice around the slot with the same cable, etc.

The loop cable shall be placed in the sawed slot in the same direction (either clockwise or counter-clockwise) for all loops on the same approach.

A blunt instrument shall be used to seat the loop cable at the bottom of the sawed slot. In no case shall a screwdriver or similar sharp tool be used that could damage the cable jacket.

A loop system is defined as two, three, or four loops in one lane that is connected to a detector loop amplifier as shown on the plans.

Each loop shall be tested after installation in the roadway and again after the slot has been sealed.

After the loop cable is installed in the cut slots and tested, the slot shall be filled with a pre-approved polyurethane resin sealant.

The loop cables in the junction box shall be tagged with a permanent type wire marker indicating approach, loop number, and input or output (i.e., Loop No. 1, Lane a, the north approach, input = Na1+ and output = Na1-).

The lead-in cable shall be connected to the loop wire only in a junction box with a soldered, waterproof splice. The splice insulating package shall be so made as to include all loop leads, loop lead-in cable and lead-in shield as one unit and extend a minimum of 1 in. (25 mm) onto the outside jacket of the lead-in cable.

The lead-in cable shield at the cabinet end shall be grounded to the system ground. The cable shield at the junction box shall be soldered so as to be continuous throughout the intermediate junction boxes and shall be included in the insulated splice to prevent grounding at any junction box.

The test conductor shall run continuous from the farthest junction box in each loop system to the controller cabinet. No splices will be allowed in the test conductor.

No electrical conductors carrying over 50 volts shall be installed in the loop detection conduits or junction boxes.

Each loop system shall have a comparative inductance test. Each loop, as well as the system with which the loop is associated, shall be tested as indicated below.

Ground Fault Test:

Prior to splicing to the lead-in cable, individual loops shall be tested between the loop conductor and an approved ground point with a 500 volt hand-charged megohm meter. Biddle Model 212159CL, AEMC Corporation Model 1250 or equal.

Loop systems shall be tested, with their leads unterminated, at the control cabinet between one of the two lead-in conductors and approved ground point with a 500 Volt hand-charged megohm meter. Biddle Model 212159CL, AEMC Corporation Model 1250 or equal.

The minimum reading for the loop system test shall be not less than 100 megohms. For the individual loop test; the minimum reading on the hand charged meter shall be infinity. Any discrepancy shall be corrected prior to signal turn on.

Comparative Inductance Test:

Each loop system shall be checked with a Loop Testing meter of a type accepted for use by the Headquarters Traffic Section.

The values for the above tests shall be recorded and certified by the Contractor, using forms provided by the state.

Field testing shall consist of 14 consecutive days of normal operation without a failure. The Contractor shall give written notice when the signal system is complete and prior to commencing the operational test. Any part or component of the signal equipment furnished by the Contractor which fails during the test period or prior to final project acceptance shall be corrected by the Contractor at no additional cost to the state.

Those items of the signal equipment furnished by the state and installed by the Contractor which fail due to no fault of the Contractor prior to final project acceptance will be corrected by the state at no expense to the Contractor.

656.04 Method of Measurement. Traffic signal installation will be measured by the lump sum complete in place, at the location specified on the plans.

656.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Traffic Signal Installation	Lump Sum

Excavation, backfilling, surfacing, and materials will not be paid for separately, but shall be considered as subsidiary work and the cost thereof included in the contract price for Traffic Signal Installation.

SECTION 700 - MATERIALS

SECTION 701 - PORTLAND CEMENT

701.01 General Requirements. Portland cement shall conform to the following specifications for the type specified or permitted:

Type	Specifications
Portland Cement	AASHTO M 85 Type I, II, or III
Blended Hydraulic Cement	AASHTO M 240 Type IP, P, or I (PM)

Portland cement containing more than 0.6 percent total alkali shall not be used. Prior approval will be necessary for use of Type III cement in any construction other than pre-cast stringers.

Unless otherwise permitted, the product of only one mill or other brand and type of Portland cement shall be used in any one component of a structure, i.e., abutments, columns, stringers, deck, etc.

701.02 Acceptance Requirements. Portland cement materials may be accepted for use on the basis of the manufacturer's certification as provided in Subsections 106.04 and 106.05.

SECTION 702 - ASPHALT

702.01 Asphalt. Asphalt Binder shall conform to AASHTO M 320; Standard Specification for Performance Graded Asphalt Binder, except as follows:

When polymer modification is specified or when the sum of the grade designation temperatures exceeds 90, the following requirement shall apply:

Elastic Recovery (AASHTO-AGC-ARTBA Joint Committee, task force 31, Appendix B) at 25 degrees C shall not be less than 50% when performed on residue from the Rolling Thin Film Oven Test (RTFOT).

Unless otherwise permitted, all asphalt for a specified use shall be furnished by one supplier. If change of supplier for asphalt binder is

proposed, or if blending of asphalt binder from more than one supplier is proposed, mix design testing and verification are required as conditions of approval.

702.02 Liquid Asphalts. Liquid asphalts shall conform to the following requirements:

Rapid curing asphalts shall meet the requirements of AASHTO M 81.

Medium curing asphalts shall meet the requirements of AASHTO M 82.

Slow curing asphalts shall meet the requirements of ASTM D 2026.

RUBBERIZED LIQUID ASPHALT SPECIFICATIONS

		RC-800R		RC-3000R	
PROPERTY	**ASTM NO.**	**MIN.**	**MAX.**	**MIN.**	**MAX.**
Flash Point, T.O.C., °F (°C)	D 1310		80 (27)		80 (27)
Viscosity, 140°F (60°C), cst	D 2170	800	1600	3000	6000
Distillation: 30 in. Hg (760 mm Hg)	D 402				
percent of Total Dist. to 680°F (360°C)					
To 437°F (225°C)		15			
500°F (260°C)		45		25	
600°F (316°C)		75		70	
Res. Vol. percent by Difference		75		80	
Tests on Rubberized Base Asphalt:					
Viscosity, 140°F (60°C)					
poises	D 2171	1600	2400	1600	2400
Pa•s	D 2171	(160)	(240)	(160)	(240)
Duct, 77°F (25°C), 5 cm/min, cm	D 113	150		150	
Duct, 39°F (4°C), 5 cm/min, cm	D 113	35		35	
Toughness, in.-lb. (N•mm)	*	75 (848)		75 (848)	
Tenacity, in.-lb. (N•mm)	*	50 (565)		50 (565)	

*.Benson method of Toughness and Tenacity, Scott Tester, in.-lb. (mm•N) at 77°F (25°C), 20 in. (508 mm) per minute pull. Tension head 7/8 in. (22 mm) diameter.

Sampling-Rubberized Base Asphalt samples taken at point of manufacture of the liquid asphalt shall be the material tested for compliance of Rubberized Base Asphalt. Liquid asphalt samples taken at point of delivery will be tested for compliance of properties other than rubberized base asphalt requirements.

702.03 Emulsified Asphalts. Emulsified asphalts shall conform to the following requirements. The requirements for sieve tests shall be deleted for asphalt tie-down.

Anionic emulsified asphalt shall meet the requirements of AASHTO M 140.

Cationic emulsified asphalt shall meet the requirements of AASHTO M 208, except Saybolt viscosity of CRS-2 shall be in the range from 150 minimum to 400 maximum.

This specification shall be modified to include a CRS-2h grade having the same properties as CRS-2 except the penetration test on residue shall be 50-100 and all grades of Rapid-Setting emulsion shall be homogeneous after thorough mixing within 15 days after delivery.

CRS-2R shall be emulsified blend of asphalt, rubber, water, and emulsifiers. The asphalt cement shall be thoroughly blended with a minimum of 1.5 percent total rubber solids. The emulsified blend shall conform to the following requirements:

	SPECIFICATIONS		AASHTO TEST
PROPERTY	**MINIMUM**	**MAXIMUM**	**NUMBER**
Viscosity, Saybolt Furol at, 122°F (50°C), seconds	150	400	T 59
Storage stability test, 24 hours, percent		1.0	T 59
Demulsibility test, percent	40		T 59
Particle charge test		Positive	T 59

Sieve test, percent		0.10	T 59
Oil distillate by distillation:			
Oil distillate by volume of emulsion, percent		3.0	T 59
Residue by evaporation, percent	65		T 59 (Method B)
Test on residue:			
Penetration, 77°F (25°C), 3.5 oz. (100 g), 5 seconds	80	150	T 59, T 49

702.04 Anti-Stripping Additive. When directed, asphalt products shall be treated with a heat-stable anti-stripping additive. When anti-stripping additive other than lime or latex is used, either 0.5 percent or 1.0 percent will be used. Samples of the treated asphalt shall be tested in accordance with Idaho T-99. Material which fails to indicate the presence of anti-strip shall be rejected and removed from the work.

Samples of the proposed anti-strip and asphalt shall be submitted for approval prior to use. Testing and acceptance will be in accordance with Idaho T-137.

702.05 Loading Certificate. Each shipment of asphalt shall be accompanied by a copy of the loading certificate providing the following information:

1. Contractor and project number.

2. Refinery.

3. Supplier, if other than refinery.

4. Car or delivery ticket number.

5. Type and grade of asphalt.

6. Specific gravity.

7. Temperature when loaded.

8. Shipment.

   a. *Truck.* Individual certified weights of each loaded truck and trailer and the tare weight of each vehicle. Individual compartment asphalt weight must be certified for multiple compartment hauling units.

   b. *Railroad Car.* Certified volume of asphalt loaded and the weight of the asphalt loaded computed from the volume corrected in accordance with section 109-Measurement and Payment.

9. Consistency of material.

   a. Saybolt Viscosity of Emulsified asphalt.

   b. For Performance Graded Binder, attach copies of the applicable quality control test reports required by Subsection 702.08, or refer to the applicable test reports by date, test numbers, or other identifying data.

10. The signature of authorized refinery or supplier representative.

11. When an anti-stripping additive is specified, the percentage of additive by weight of asphalt and the brand, grade, or type of additive must be shown on the loading certificate.

702.06 Sampling and Testing. Asphalt shall be sampled in accordance with AASHTO T 40. Asphalt testing will be in accordance with appropriate AASHTO and ASTM test methods. The presence of anti-stripping additive will be checked for in accordance with Idaho T-99.

702.07 Temperature Viscosity Curve. Each shipment of asphalt shall be accompanied by a copy of temperature viscosity curve representing the material.

702.08 Asphalt Certification. The supplier shall submit a process control plan to the Engineer and the Central Materials Laboratory for review. The supplier shall certify that all Performance Graded Binder supplied to the project meets the specified grade when tested in accordance with AASHTO MP-1 and Subsection 702.01.

The supplier shall perform at least one complete set of quality control tests for each 500 Ton (500 metric tons) of product produced. A copy of each test report shall be furnished to the Central Materials Laboratory and the Engineer.

Polymerized Performance Graded Binder shall be clearly identified by lot. Polymerized PG Binders that have remained in storage for 21 calendar days or more, after original blending, shall be re-tested using normal production tests.

Only supplier blended polymerized PG Binders shall be used. No modifiers/polymers shall be introduced at the asphalt mix plant unless a QC/QA program submitted by the supplier is approved.

SECTION 703 - AGGREGATES

703.01 General Requirements. Aggregates shall be reasonably free from wood, roots, bark, soft or disintegrated pieces, or other detrimental matter. Blend sand may be approved for use to correct deficiencies in the grading sizes, provided the combination meets the specification requirements for the class of material being produced. For specification requirements, the percent passing gradations will be rounded to the nearest whole number except the percent passing the No. 200 (0.075 mm) mm sieve shall be rounded to the nearest tenth if the percent passing is less than ten.

Sodium sulfate soundness testing shall be performed in accordance with AASHTO T 104 when requested by the Engineer. Test results shall conform to:

AASHTO M6 (fine concrete aggregate)
AASHTO M29 (fine plantmix aggregate),
AASHTO M80 (coarse concrete aggregate)

For coarse plantmix aggregate, the sodium sulphate soundness loss shall not exceed 12% at 5 cycles.

Conformance with the following is required for aggregate source qualification.

a. Basalt Sources, Idaho T-116, minimum of 90 percent retained on 3/8 in. (9.5 mm) sieve.

b. All sources, Idaho T-15.

Orig. percent Pass No.200 (0.075 mm)	Final percent Pass No.200 (0.075 mm)	Orig. Sand Equiv.	Final Sand Equiv.
5 through 8	Not greater than Orig. percent plus 5	40 or above	30 min
9	14 max	36 through 40	30 min
10	15 max	30 through 35	25 min

c. All sources, Idaho T-142.

703.02 Fine Aggregate for Concrete. Fine aggregate for concrete shall conform to the following gradation:

Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100
No.4 (4.75 mm)	95-100
No.16 (1.18 mm)	45-80
No.50 (0.30 mm)	10-30
No.100 (0.15 mm)	2-10
No.200 (0.075 mm)	0-4

For concrete wearing surfaces (pavements, approach slabs, and bridge decks), the percent passing the No. 200 (0.075 mm) sieve size shall be 0-2 except that up to 3 percent passing the No. 200 (0.075 mm) sieve will be accepted if the sand equivalent is at least 80.

Sand equivalent shall be a minimum of 70.

Deleterious substances shall not exceed the following limits:

	Percent by Mass Max
Clay Lumps	1.0
Coal and Lignite	1.0
All others (Shale, Alkali, Mica, Coated Grains, Soft and Flaky Particles)	5.0

Fine aggregate shall comply with the Organic Impurities section of AASHTO M6.

Idaho T- 13 tests will only be performed on samples meeting all other specification

requirements for fine aggregate for concrete. When Aggregates are tested for mortar making properties, in accordance with Idaho T- 13, the following criteria shall apply:

Cement	**Type I and II**	**Type III**
Age at Testing	7 days and 28 days	3 days and 7 days
Comparative Strength, Min.	90 percent	90 percent

Limestone fine aggregate shall not be used in concrete wearing surfaces.

Aggregates found to be potentially reactive per AASHTO T 303 shall require mitigating measures. Expansions greater than 0.10 percent as determined according to AASHTO T 303 will be considered potentially reactive. The Contractor shall conduct AASHTO T 303 testing in order to determine the potential reactivity of the aggregates.

Mitigating measures may include the use of fly ash, lithium admixtures, or other material as approved by the Engineer. The Contractor shall submit evidence in the form of test results from AASHTO T 303 that demonstrate the proposed mitigation when used with the cement and aggregates proposed will control the potential expansion before the aggregate source may be used in concrete.

703.03 Coarse Aggregate for Concrete. Coarse aggregate for concrete shall conform to the following gradations:

COARSE AGGREGATE SIZE NO.

SIEVE SIZE	**1**	**2a**	**2b**	**3**	**4**	**5**
			PERCENT PASSING			
2 1/2 in. (63 mm)						100
2 in. (50 mm)					100	95-100
1 1/2 in. (37.5 mm)				100	95-100	
1 in. (25 mm)		100	100	95-100		35-70
3/4 in. (19 mm)	100	95-100	80-100		35-70	
1/2 in. (12.5 mm)	90-100			25-60		10-30
3/8 in. (9.5 mm)	40-70	20-55	10-40		10-30	
No. 4 (4.75 mm)	0-15	0-10	0-4	0-10	0-5	0-5
No. 8 (2.36 mm)	0-5	0-5		0-5		

Size No. 2a or 2b may be provided when coarse aggregate Size No. 2 is required.

Sizes 4 and 5 shall be a combination of two or more coarse aggregates.

The amount of deleterious substances shall not exceed the following limits:

	Percent by Mass Max
Coal and Lignite	1.0
Clay Lumps	0.5
Clay Lumps and Friable Particles	2.0
Material Passing No. 200 (0.075 mm) Sieve	1.0
Flat and Elongated Aggregate Particles (Length to Thickness Ratio Greater Than 5)	15.0

The aggregate shall not show a loss of more than 35 in the Los Angeles Abrasion Test.

Limestone coarse aggregate shall not be used in concrete wearing surfaces.

Aggregates found to be potentially reactive per AASHTO T 303 shall require mitigating measures. Expansions greater than 0.10 percent as determined according to AASHTO T 303 will be considered potentially reactive. The Contractor shall conduct AASHTO T 303 testing in order to determine the potential reactivity of the aggregates.

Mitigating measures may include the use of fly ash, lithium admixtures, or other material as approved by the Engineer. The Contractor shall submit evidence in the form of test results from AASHTO T 303 that demonstrate the proposed mitigation when used with the cement and aggregates proposed will control the potential expansion before the aggregate source may be used in concrete.

703.04 Aggregate for Untreated Base, Treated Base and Road Mix. Aggregate shall conform to one of the following gradations as specified:

	NOMINAL MAXIMUM SIZE						
SIEVE SIZE	**3/8 in.** (9.5 mm)	**1/2 in.** (12.5 mm)	**3/4 in. A** (19 mm A)	**3/4 in. B** (19 mm B)	**1 in. A** (25 mm A)	**1 in. B** (25 mm B)	**2 in.** (50 mm)
			PERCENT PASSING				
2 1/2 in. (63 mm)							100
2 in. (50 mm)						100	90-100
1 1/2 in. (37.5 mm)					100		
1 in. (25 mm)			100	100	90-100	90-100	55-83
3/4 in. (19 mm)		100	90-100	90-100			
1/2 in. (12.5 mm)	100	90-100			60-80	65-100	
3/8 in. (9.5 mm)	85-100						
No. 4 (4.75 mm)	55-75	50-70	30-60	40-65	35-60	40-80	30-60
No. 8 (2.36 mm)	40-60	35-55		30-50	25-50	30-60	
No. 30 (0.60 mm)	20-40	12-30	10-25		10-30	15-35	10-25
No. 200 (0.075 mm)	3-9	3-9	0-7	3-9	2-9	6-18	0-8

The sand equivalent shall not be less than 30 if 5 percent or more of the material passes the No. 200 (0.075 mm) sieve. Sand equivalent will not be required if less than 5 percent passes the No. 200 (0.075 mm) sieve, or for aggregate to be used for lime or cement treated base.

The aggregate shall not show a loss of more than 35 in the Los Angeles Abrasion Test. The material shall have a minimum R–value of 75 as measured by Idaho T-8. When tested in accordance with AASHTO T 182, aggregate for road mix shall have a retained asphalt film above 95 percent. Road mix aggregate not meeting this requirement may be used in combination with an anti-strip agent, provided the combination meets the 95 percent requirement.

The percentage of aggregate retained on the No. 4 (4.75 mm) sieve having at least one fractured face as determined by AASHTO TP-61, Method 1 shall be 60 percent for untreated base and 75 percent for treated base and road mix.

703.05 Aggregate for Plant Mix Pavement. Aggregate for Class I or II mixes, as a minimum, shall be provided in three separate stockpiles, two coarse and one fine. When Class III mix is required, aggregate may be provided in a single stockpile if the mix meets all crushed gravel of such gradation that when combined with other required aggregate fractions and fillers, in proper proportion, the resultant mixture

shall meet the gradation required under the composition of mixture for the specific class under contract.

Coarse Aggregate. The coarse aggregate stockpiles shall contain less than twelve percent material passing the No. 4 (4.75 mm) sieve.

Fine Aggregate. The fine aggregate stockpile(s) shall contain no more than twelve percent material retained on the No. 4 (4.75 mm) sieve. The Engineer may approve the addition of "naturally occurring fine material" when proposed to improve mix performance.

The coarse and fine aggregate fractions for the mixture shall be sized, graded, and combined in such proportions that the resulting composite blend meets the following grading requirements:

Note: (*) denotes the sieves that will be used for quality acceptance.

English Table

1 1/2 in. Nominal Size				
Sieve	Control Points		Restricted Zone Boundary	
In.	Min.	Max.	Min.	Max.
2		100.0		
*1 1/2	90.0	100.0		
1		90.0		
3/4				
*1/2	40.0	70.0		
3/8				
No. 4			34.7	34.7
*No. 8	15.0	41.0	23.3	27.3
No. 16			15.5	21.5
No. 30			11.7	15.7
No. 50			10.0	10.0
No. 100				
*No. 200	0.0	6.0		

1 in. Nominal Size				
Sieve	Control Points		Restricted Zone Boundary	
In.	Min.	Max.	Min.	Max.
1 1/2		100.0		
*1	90.0	100.0		
3/4		90.0		
1/2				
*3/8	42.0	70.0		
No. 4			39.5	39.5
*No. 8	19.0	45.0	26.8	30.8
No. 16			18.1	24.1
No. 30			13.6	17.6
No. 50			11.4	11.4
No. 100				
*No. 200	1.0	7.0		

3/4 in. Nominal Size				
Sieve	Control Points		Restricted Zone Boundary	
In.	Min.	Max.	Min.	Max.
1		100.0		
*3/4	90.0	100.0		
1/2		90.0		
*3/8	52.0	80.0		
No. 4				
*No. 8	23.0	49.0	34.6	34.6
No. 16			22.3	28.3
No. 30			16.7	20.7
No. 50			13.7	13.7
No. 100				
*No. 200	2.0	8.0		

1/2 in. Nominal Size				
Sieve	Control Points		Restricted Zone Boundary	
In.	Min.	Max.	Min.	Max.
3/4		100.0		
*1/2	90.0	100.0		
3/8		90.0		
No. 4				
*No. 8	28.0	58.0	39.1	39.1
No. 16			25.6	31.6
No. 30			19.1	25.6
No. 50			15.5	15.5
No. 100				
*No. 200	2.0	10.0		

3/8 in. Nominal Size				
Sieve	Control Points		Restricted Zone Boundary	
mm	Min.	Max.	Min.	Max.
1/2		100.0		
*3/8	90.0	100.0		
No. 4		90.0		
*No. 8	32.0	67.0	47.2	47.2
No. 16			31.6	37.6
No. 30			23.5	27.5
No. 50			18.7	18.7
No. 100				
*No. 200	2.0	10.0		

Metric Table

37.5 mm Nominal Size				
Sieve	Control Points		Restricted Zone Boundary	
mm	Min.	Max.	Min.	Max.
50		100.0		
*37.5	90.0	100.0		
25		90.0		
19				
*12.5	40.0	70.0		
9.5				
4.75			34.7	34.7
*2.36	15.0	41.0	23.3	27.3
1.18			15.5	21.5
0.600			11.7	15.7
0.300			10.0	10.0
0.150				
*0.075	0.0	6.0		

25 mm Nominal Size				
Sieve	Control Points		Restricted Zone Boundary	
mm	Min.	Max.	Min.	Max.
37.5		100.0		
*25	90.0	100.0		
19		90.0		
12.5				
*9.5	42.0	70.0		
4.75			39.5	39.5
*2.36	19.0	45.0	26.8	30.8
1.18			18.1	24.1
0.600			13.6	17.6
0.300			11.4	11.4
0.150				
*0.075	1.0	7.0		

19 mm Nominal Size				
Sieve	Control Points		Restricted Zone Boundary	
mm	Min.	Max.	Min.	Max.
25		100.0		
*19	90.0	100.0		
12.5		90.0		
*9.5	52.0	80.0		
4.75				
*2.36	23.0	49.0	34.6	34.6
1.18			22.3	28.3
0.600			16.7	20.7
0.300			13.7	13.7
0.150				
*0.075	2.0	8.0		

12.5 mm Nominal Size				
Sieve	Control Points		Restricted Zone Boundary	
mm	Min.	Max.	Min.	Max.
19		100.0		
*12.5	90.0	100.0		
9.5		90.0		
4.75				
*2.36	28.0	58.0	39.1	39.1
1.18			25.6	31.6
0.600			19.1	25.6
0.300			15.5	15.5
0.150				
*0.075	2.0	10.0		

9.5 mm Nominal Size				
Sieve	Control Points		Restricted Zone Boundary	
mm	Min.	Max.	Min.	Max.
12.5		100.0		
*9.5	90.0	100.0		
4.75		90.0		
*2.36	32.0	67.0	47.2	47.2
1.18			31.6	37.6
0.600			23.5	27.5
0.300			18.7	18.7
0.150				
*0.075	2.0	10.0		

The aggregate shall not show a loss of more than 30 in the Los Angeles Abrasion Test.

The aggregate to be used for plant mix shall be screened so that not more than 10 percent of the naturally occurring material passing the ½ in. (12.5 mm) sieve, remains in material used to produce coarse and fine stockpile(s). The material retained on the ½ in. (12.5 mm) sieve, thus produced shall be crushed to produce the required gradation.

The blend of aggregate as crushed and/or blended shall have a sand equivalent of not less than 35 when the combined sample is tested.

Ninety percent of the aggregate retained on the No.4 (4.75 mm) sieve in the stockpile(s) shall have a minimum of one fractured face, and sixty percent shall have at least two fractured faces, as determined by AASHTO TP-61, Method 1. Flat and elongated aggregate particles (Length greater than 5 times average thickness) shall not exceed 15 percent by weight in the coarse aggregate.

The following aggregate gradations shall apply for single stockpile Class IV plant mix and when single stockpile Class III plant mix is permitted.

	NOMINAL MAXIMUM SIZE		
SIEVE SIZE	(3/4 in.) (**19 mm**)	(1/2 in.) (**12.5 mm**)	(3/8 in.) (**9.5 mm**)
	PERCENT PASSING		
1 in. (25 mm)	100	100	
3/4 in. (19 mm)	95-100	100	
1/2 in. (12.5 mm)	75-90	95-100	100
3/8 in. (9.5 mm)	60-85	75-90	90-100
No. 4 (4.75 mm)	40-65	50-75	60-85
No. 8 (2.36 mm)	25-50	35-60	40-65
No. 30 (0.60 mm)	14-30	15-35	20-40
No. 50 (0.30 mm)	9-21	10-25	12-28
No. 200 (0.075 mm)	3-8	4-8	6-10

Aggregate as crushed and/or blended shall have a sand equivalent of not less than 35 when the combined sample is tested.

Stockpiles of reclaimed asphalt pavement (RAP) shall be limited to 10 ft (3 m) in height and no equipment will be allowed on top of the stockpile. It may be necessary to use a dozer or other means to remove material from the stockpile.

When tested in accordance with AASHTO T 165, plant mix aggregate shall have an index of retained strength of 85 percent or more. Plant mix aggregate not meeting this requirement may be used in combination with an anti-strip agent, provided the combination meets the 85 percent requirement.

703.06 Aggregate for Cover Coat Material. Aggregate for cover coat material shall conform to one of the following requirements for gradation as specified:

Gradation Table

Sieve Size	Class 1	Class 2	Class 3	Class 4	Class 5
		Percent Passing			
3/4 in. (19 mm)					100
5/8 in. (16 mm)	100				
1/2 in. (12.5 mm)		100	100	100	80-100
3/8 in. (9.5 mm)	30-55	30-55	40-90	95-100	
No.4 (4.75 mm)	0-6	0-6	0-6	0-6	
No.8 (2.36 mm)	0-4	0-4	0-4	0-4	7-35
No. 200 (0.075 mm)	0-2	0-2	0-2	0-2	0-5

The aggregate for Classes I, II, III and IV cover coat material shall have a cleanness value of not less than 75.

For gravel sources at least 70 percent by weight of the particles retained on the No. 4 (4.75 mm) sieve shall have one fractured face or more as determined by AASHTO TP-61, Method 1.

Cover coat material shall not show a loss of more than 30 in the Los Angeles Abrasion Test, Grading C, unless otherwise specified. When tested in accordance with AASHTO T 182, cover coat material shall have a retained asphalt film above 95 percent. Aggregate not meeting this requirement may be used in combination with an anti-strip agent, provided the combination meets the 95 percent requirement.

703.07 Aggregate for Blotter. Aggregate for blotter shall conform to the following gradation:

SIEVE SIZE	PERCENT PASSING
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	40-100
No. 200 (0.075 mm)	0-16

703.08 Aggregate for Open Graded Rock Base (Rock Cap). Aggregate for Rock Cap shall conform to the following gradation, performed using AASHTO T 27, excluding washing.

Screen/Sieve Size	%Passing (by weight)
3 in. (75.0 mm)	100
1 1/2 in. (37.5 mm)	55-85
3/4 in. (19.0 mm)	10-35
1/2 in. (12.5 mm)	5-15
No. 4 (4.75 mm)	0-5

Material for Rock Cap shall be clean, angular, crushed quarry rock, free of clay coatings, lumps and soft or flaky particles.

The material shall have a loss of not more than 40% in the Los Angeles Abrasion test.

The minimum sample size shall be 65 lb. (30 kg).

703.09 Aggregate for Extrusions. Aggregate for asphalt or portland cement extrusions shall conform to the applicable gradation.

GRADATION TABLE

SIEVE SIZE	ASPHALT	CONCRETE	
		NO. 1	NO. 2
	PERCENT PASSING		
3/4 in. (19 mm)	100		100
1/2 in. (12.5 mm)	95-100	100	90-100
3/8 in. (9.5 mm)	85-100	75-100	70-100
No. 4 (4.75 mm)	60-80	50-75	50-75
No. 8 (2.36 mm)	40-60	30-55	30-55
No. 16 (1.18 mm)		20-40	20-40
No. 30 .(0.60 mm)		12-25	15-32
No. 50 (0.30 mm)	12-25	5-15	10-25
No. 100 (0.15 mm)		0-15	0-10
No. 200 (0.075 mm)	3-10	0-2	0-2

703.10 Aggregate for Anti – Skid. Aggregate for anti-skid material shall conform to the applicable gradation.

GRADATION TABLE

	TYPE				
	1	2*	3	4	5
SIEVE SIZE	**PERCENT PASSING**				
3/8 in. (9.5 mm)	100	100	100	100	100
No. 4 (4.75 mm)	0-40			0-70	
No. 8 (2.36 mm)	0-10	0-40			
No. 30 (0.60 mm)			0-25	0-30	
No. 100 (0.15 mm)		0-2			
No. 200 (0.075 mm)	0-5		0-5	0-10	

* Also requires <45% L.A. wear

703.11 Aggregate for Granular Subbase. Aggregate for Granular Subbase shall conform to the following, performed using AASHTO T 27, excluding washing.

SIEVE SIZE	PERCENT PASSING
4 in. (100 mm)	100
3 in. (75 mm)	90-100
No. 4 (4.75 mm)	30-75
No. 200 (0.075 mm)	0-15

The material shall have a minimum R - value of 60, as measured by Idaho T-8 and shall not show a loss of more than 40 in the Los Angeles Abrasion Test.

The sand equivalent shall not be less than 30 if 5 percent or more of the material passes the No. 200 (0.075 mm) sieve. Sand equivalent will not be required if less than 5 percent passes the No. 200 (0.075 mm) sieve, as measured by AASHTO T 176 Modified.

The minimum sample size shall be 65 lb. (30 kg).

703.12 Sampling and Testing. Aggregates will be sampled and tested in accordance with the following applicable standard methods:

Sieve Analysis of Fine and Coarse Aggregates ..... AASHTO T 27 with

Amount of Material Finer than 0.075 mm (No. 200) Sieve .....AASHTO T 11
Method A or B
Organic Impurities in Sands for Concrete .....AASHTO T 21
Soil and Aggregate Sample Preparation IdahoT-59
Effect of Organic Impurities in Fine Aggregate
on Strength of Mortar .....AASHTO T 71
Determining the Percentage of Fracture .....AASHTO TP-61
in Coarse Aggregate .....Method 1
Evaluating Cleanness of Cover Coat Material IdahoT-72
Sampling of Aggregates .....AASHTO T 2
Resistance to Degradation of Small-size Coarse Aggregate
by Abrasion and Impact in the Los Angeles Machine .....AASHTO T 96
Clay Lumps and Friable Particles in Aggregate .....AASHTO T 112
Lightweight Pieces in Aggregate .....AASHTO T 113
Plastic Fines in Graded Aggregates and Soils by Use of the
Sand Equivalent Test .....AASHTO T 176 Modified
Alternate Method No. 2-Pre-Wet
Methods of Chemical Analysis of Limestone, Quicklime,
and Hydrated Lime .....ASTM C 25
Uncompacted Void Content of Fine Aggregate .....AASHTO T304
Method A
Standard Test Method for Flat Particles
Elongated Particles, or Flat and Elongated
Particles in Coarse Aggregate .....ASTM D4791
Accelerated Detection of Potentially Deleterious Expansion
of Mortar Bars due to Alkali-Silica Reaction .....AASHTO T 303
Low alkali cement may be used. Modified
AASHTO T303 procedures are required
for expansion mitigation testing using fly
ash, lithium, or other additives.

703.13 Aggregate Source Approval. In addition to the cited tests for specified values, data from the following procedures shall be provided for use in determining the acceptability of aggregate and borrow sources when applicable.

Idaho Degradation IdahoT-15
Investigation of Aggregate and Borrow Deposits IdahoT-142
Method of Test for Disintegration of Quarry Aggregates
(Ethylene Glycol) IdahoT-116

Specific Gravity and Absorption of Fine Aggregate .....AASHTO T 84
Specific Gravity and Absorption of Coarse
Aggregate.....AASHTO T 85
Specific Gravity of Soils .....AASHTO T 100
Soundness of Aggregate by use of Sodium Sulfate or
Magnesium Sulfate .....AASHTO T 104

Other tests will be made on the following categories of material:

1. *Base Course Material*

Compaction of Soils and Soil Mixtures for the Expansion
Pressure and Hveem Stabilometer Tests IdahoT-8

Freezing and Thawing Tests of Compacted Soil Cement Mixtures - Portland Cement Association, Soil Cement Laboratory Handbook.

2. *Asphalt Treated Material*

Preparation of Test Specimens of Bituminous Mixture by Means of
California Kneading Compactor .....AASHTO T 247
Resistance to Deformation and Cohesion of Bituminous Mixtures
by Means of Hveem Apparatus .....AASHTO T 246
(Cohesion section of T 246 does not apply)
Coating and Stripping of Bitumen-Aggregate Mixtures .....AASHTO T 182
Percent Air Voids in Compacted Dense
and Open Bituminous Paving Mixtures .....AASHTO T 269
Maximum Specific Gravity of
Bituminous Paving Mixtures .....AASHTO T 209
Bulk Specific Gravity of Compacted
Bituminous Mixtures .....AASHTO T 166
AASHTO T 275
Effect of Water on Cohesion of Compacted Bituminous
Mixtures .....AASHTO T 165

3. *Borrow*

Compaction of Soils and Soil Mixtures for the Expansion Pressure
and Hveem Stabilometer Tests IdahoT-8

4. *Fine Aggregate for Concrete*

Measuring Mortar-Making Properties of Fine Aggregate IdahoT-13
Accelerated Detection of Potentially Deleterious Expansion
Of Mortar Bars Due to Alkali-Silica Reaction.....AASHTO T 303
Low alkali cement may be used. Baseline testing,
with cement and aggregate only, is required.

5 Coarse Aggregate for Concrete

Accelerated Detection of Potentially Deleterious
Expansion of Mortar Bars Due to Alkali-Silica Reaction……AASHTO T-303
Low alkali cement may be used. Baseline testing,
with cement and aggregate only, is required.

SECTION 704 - JOINT FILLERS AND SEALERS

704.01 Pre-formed Expansion Joint Filler. Pre-formed expansion joint filler shall conform to AASHTO M 153 or AASHTO M 213. Sound Redwood or Cedar may be used unless specified types are called for on the plans.

704.02 Joint Sealer for Asphalt and Concrete Pavements. Joint Sealants, hot-poured, for concrete and asphalt pavements shall meet the requirements of ASTM D 3405.

704.03 Hot Poured Elastomeric Type Concrete Joint Sealer. Hot poured elastomeric joint sealer shall meet the requirements of ASTM D 3406.

704.04 Neoprene Compression Seal. Neoprene compression seals shall meet the requirements of AASHTO M 220. Adhesive lubricant shall meet the requirements of ASTM D 4070 for bridges and ASTM D 2835 for Concrete Pavement.

The Contractor shall furnish a manufacturer's certification that all material conforms with these specifications and the requirements of the manufacturer.

The Contractor shall submit shop drawings to the Engineer for review in accordance with Subsection 105.02. Installation procedures shall be furnished to the Engineer with the shop drawing submittal.

The compression seal shall be installed in accordance with the manufacturer's recommendations, utilizing the proper size of installation tool as recommended by the manufacturer. All metal surfaces that will contact the seal shall be cleaned in accordance with SSPC-SP6.

704.05 Silicone Sealant. Low modulus silicone joint sealant material shall be of the type designated on the plans.

The Contractor shall arrange for sampling and testing of each lot of silicone sealant prior to use. Sampling and testing shall be performed by independent laboratories. No material from a given lot shall be placed until test results have been received by the Engineer, evaluated for conformance with typical properties listed in the manufacturer's design information bulletins, and that lot has been approved for placement. Allow 30 days for testing.

The specific tests required are:

1. Tensile stress at 150 percent Elongation*;

2. Total Elongation*; and Tack Free Time**

   * ASTM D 412, Method A, Die C, 7-day cure at 77°F ± 2°F (25°C ± 1°C) and 50 ±5 percent relative humidity.

   ** ASTM C 679

This testing is considered incidental, and no separate payment will be made.

Silicone sealant shall be delivered in the manufacturer's original sealed container. Each container shall have, intact, the original manufacturer's label, which shall be legibly marked with the manufacturer's name, trade name of the sealer, production lot number, and expiration date of the manufacturer's shelf life warranty. Sealant that has exceeded this expiration date shall be re-tested at the Contractor's expense and approved prior to use. Sealant shall not be used if more than six months have elapsed since such re-testing.

704.06 Elastomeric Sheet. The elastomeric sheet shall be fabricated with nylon fabric embedded in a high quality vulcanized elastomeric compound using polymerized chloroprene as the only basic elastomer. The elastomeric sheet shall be smooth, shall be free from pinholes and surface blemishes, shall show no evidence of ply delamination, and

shall meet the physical requirements shown in the table below. Methods and materials used to install the sheet to the required length shall be compatible and shall result in a leak-proof sheet.

Elastomeric sheet shall be accompanied by a manufacturer's certificate attesting conformance with these specifications.

Physical Property	Test Method	Performance Requirements
Hardness, Durometer A	ASTM D 2240	60±10 points
Tensile strength	ASTM D 412	2000 psi, min. (13.8 MPa), min.
Elongation at break	ASTM D 412	300 percent min.
Brittleness temperature	ASTM D 746	-40°F(-40°C) Tear resistance
	ASTM D 624 (Die C)	150 lb./in. (26.3 kN/m) min.
Flame resistance	ASTM C 542	must not propagate flame
Resistance to heat aging change in original properties after 70 hrs. at 212°F (100°C)	ASTM D 573	
at 212°F (100°C) Hardness		+10 points, max.
Elongation		-40 percent, max.
Tensile strength		-15 percent, max.
Resistance to oil aging change in volume after 70 hrs. immersion in ASTM oil no. 3 at 212°F (100°C)	ASTM D 471	+80 percent, max.
Resistance to ozone condition after exposure to 100 pphm ozone in air for 100 hrs. 100°F (38°C) (sample under 20 percent strain.)	ASTM D 1149	No cracks
Resistance to permanent set compression set after 22 hours at 158°F (70°C)	ASTM D 395 (Method B)	30 percent, max.
Resistance to water change in weight after 7 days immersion at 158°F (70°C)	ASTM D 471	+5 percent, max.

704.07 Bridge Deck Joint Seals, General. Unless otherwise noted on plans or in Special Provisions, the elastomeric portion of each bridge deck joint seal shall be fabricated in a single piece, or shall have the individual pieces factory-vulcanized and the entire elastomeric element shipped as a single unit.

SECTION 706 - PIPE

706.01 General Requirements for Concrete Pipe. Every manufacturer furnishing concrete cement pipe under these specifications shall carry out the tests for strength, absorption, and hydrostatic pressure specified.

706.02 Concrete Sewer Pipe. This pipe shall conform to AASHTO M 86 (M 86 M) for the specified strength classes.

706.03 Concrete Pipe for Irrigation or Drainage. This pipe shall conform to ASTM C 118.

706.04 Reinforced Concrete Culvert, Storm Drain and Sewer Pipe. This pipe shall conform to AASHTO M 170 (M 170 M) for the strength classes specified. When centrifugally cast concrete pipe is supplied, the AASHTO requirements for minimum wall thickness and area of steel reinforcements may be waived, provided that the pipe meets strength and other requirements.

Add to Table 4 (Wall A):

Internal Diameter in. (mm)	Wall Thickness A in. (mm)	Area* Steel $in^2/ft.$ (cm^2/m)	Type Reinforcement
33 (825)	2 7/8 (73)	0.38 (8.0)	Elliptical
36 (900)	3 1/8 (79)	0.42 (8.8)	Elliptical
42 (1050)	3 ¾ (95)	0.49 (10.3)	Elliptical
48 (1200)	4 1/8 (104)	0.60 (12.6)	Elliptical

*Per unit length of pipe wall

Add to Table 5 (Wall A):

Minimum Concrete Strength, 6,000 psi (41.4 Mpa).

Internal Diameter in. (mm)	Wall Thickness A in. (mm)	Area* Steel $in^2/ft.$ (cm^2/m)	Type Reinforcement
12 (300)	2 (50)	0.11 (2.3)	Circular
15 (375)	2 (50)	0.21 (4.4)	Circular
18 (450)	2 1/4 (57)	0.30 (6.3)	Circular
21 (525)	2 3/8 (60)	0.39 (8.2)	Circular
24 (600)	2 1/2 (63)	0.54 (11.4)	Circular
27 (675)	2 5/8 (66)	0.50 (10.5)	Elliptical
30 (750)	2 3/4 (69)	0.55 (11.6)	Elliptical
33 (825)	2 7/8 (73)	0.63 (13.3)	Elliptical
36 (900)	3 1/8 (79)	0.70 (14.8)	Elliptical
42 (1050)	3 3/4 (95)	0.80 (16.9)	Elliptical
48 (1200)	4 1/8(104)	0.98 (20.7)	Elliptical

*Per unit length of pipe wall

706.06 Corrugated Metal Pipe and Pipe Arches. Corrugated metal pipe and pipe arches shall conform to AASHTO M 36 M or M 196 M with the following additions:

1. Special sections shall be of the same thickness as the conduit to which they are joined, and shall conform to the applicable requirements of AASHTO M 36 M or M 196 M.

2. Pipe on which the spelter coating has been damaged shall have the damaged areas painted with an approved asphalt cement or as specified in AASHTO M 36 M.

3. Close riveted pipe shall have the rivets on circumferential seams placed on approximate 2.5 in. (60 mm) centers with a maximum spacing of 3 in. (75 mm).

4. Asphalt coated pipe shall conform to AASHTO M 190, type A. Coupling bands shall not be coated unless otherwise specified.

5. Polymer coated pipe shall conform to one of the following:

a. Pipe conforming to AASHTO M 245 M, except coating thickness shall be 10 mils 0.25 mm minimum on each side.

b. Pipe conforming to AASHTO M 36, which has additionally been coated with material meeting polymer coating requirements of AASHTO M 246.

6. The provisions of Section No. 13.1 of AASHTO M 36 M requiring testing of helical welded seam corrugated metal pipe by AASHTO T 241 are waived for pipe that has had the ends successfully re-rolled into annular corrugations.

7. Spiral rib corrugated steel pipe shall conform to AASHTO M 36M, Type IR, with the following exceptions:

   Each pipe end shall be fabricated with at least two annular corrugations for joining pipe sections with coupling bands. Coupling bands shall be at least 12 in. (0.30 m). wide and shall have two corrugations, spaced to seat in the second corrugation of each pipe without creating a gap greater than 1/2 in. (12 mm), between pipe ends. Gaskets shall conform to section 6.9 of ASTM C-361 or Section 4.1 of AASHTO M 198.

8. Coupling devices other than the standard configurations may be approved, subject to the following. The supplier shall submit test data confirming that the device complies with joint performance criteria of AASHTO Standard Specifications for Highway Bridges, Division II Section No. 23. Review and approval are required prior to use.

706.07 Metallic (Zinc or Aluminum) Coated Corrugated Steel Underdrains. The pipe shall conform to AASHTO M 36 M.

706.08 Corrugated Aluminum Pipe for Underdrains. Aluminum underdrain pipe and fittings shall conform to the specifications of AASHTO M 196 M.

706.10 Corrugated Polyethylene Drainage Tubing. Corrugated polyethylene drainage tubing, perforated and unperforated, shall conform to AASHTO M 252.

706.11 Gaskets for Concrete Pipe. Gaskets for concrete pipe shall conform to AASHTO M 198, type A or B.

706.12 Rubber Gaskets for Corrugated Metal Pipe. Rubber gaskets for corrugated metal pipe shall conform to ASTM D 1056, Grade 2C3.

706.13 Acrylonitrile-Butadiene-Syrene (ABS) or Polyvinyl Chloride (PVC) Composite Sewer Pipe. ABS or PVC sewer pipe shall conform to ASTM D 2680.

706.14 Class PS 46 Polyvinyl Chloride (PVC) Pipe. PVC pipe, perforated and unperforated, shall conform to AASHTO M 278.

706.15 Ribbed Polyvinyl Chloride (PVC) Pipe. Ribbed PVC pipe shall conform to stiffness series 46 ASTM F949 or F794.

706.16 Corrugated Polyethelene (PE) Pipe. Corrugated PE pipe nominal size of 12 in. (300 mm) to 48 in. (1200 mm) diameter inclusive shall conform to AASHTO M 294. Corrugated PE pipe nominal size of 54 in. (1350 mm) and 60 in. (1500 mm) diameter shall conform to AASHTO MP 7.

706.17 Ribbed PE Pipe. Ribbed PE pipe shall conform to ASTM F 894.

SECTION 707 - PAINT

707.01 General. Paint shall be homogenous, free of contaminant and of such a consistency suitable for use. Dispersion of pigment in vehicle shall be such that the pigment does not settle excessively, does not cake or thicken in the container, and does not become granular or curdled.

707.02 Paint Formulae. Unless otherwise specified, the following formulations shall conform either to Federal Paint Specifications (TT) or Steel Structures Painting Council (SSPC). The colors, where designated, shall match Federal Standard No. 595.

FORMULA No. 1, Primer, Zinc Hydroxy Phosphite (Nalzin 2)

Specification: TT-P-615, Type II except the pigment shall be 5 lb./gal. (600 g/L) of Nalzin 2 and 1.5 lb./gal. (180 g/L) of red iron oxide.

FORMULA No. 2, Primer, Zinc Hydroxy Phosphite (Nalzin 2)

Specification: TT-P-615, Type II except the pigment shall be 33 lb./gal. (60 g/L) of Nalzin 2 and 1.5 lb./gal. (180 g/L) of red iron

oxide. Also add 1 lb. (120 g) of carbon black per 100 gal. (100L) of paint.

FORMULA No. 3, Pretreatment, Basic Zinc Chromate-Vinyl Butyral Wash Primer

Specification: SSPC-Paint 27. Zinc chromate shall be the insoluble type.

FORMULA No. 4, Traffic Line, Highway

Specification: TT-P-115, Type II, Fast Drying
Colors: 37875 White
33538 Yellow

FORMULA No. 5, Primer, Paint, Zinc-Molybdate, Alkyd Type

Specification: TT-P-645
Color: Yellow

FORMULA No. 6, Primer, Latex, Exterior, For Wood

Specification: TT-P-1984, Paint shall contain no lead, chromium or cadmium pigments, or lead driers.
Color: White and Tints

FORMULA No. 7, Enamel, Alkyd, Semi-Gloss

Specification: TT-E-529, Type I, air drying. Paint shall contain no lead, chromium or cadmium pigments, or lead driers.
Color: 24172 Forest Green

FORMULA No. 8, Enamel, Alkyd, Semi-Gloss

Specification: TT-E-529, Type I, air drying. Paint shall contain no lead, chromium or cadmium pigments, or lead driers.
Colors: 27875 White
26492 Gray, which is obtained by adding carbon black to White 27875

FORMULA No. 9, Coal Tar Epoxy - Polyamide

Paint: SSPC - Paint 16
Color: Black

FORMULA No. 10, Aluminum Paint, Ready-Mixed

Paint: TT-P-38, except the vehicle shall meet TT-V-81 and paint drying time of set-to-touch will be a minimum of 15 to a maximum of 45 minutes.

FORMULA No. 11, Paint, Latex Enamel, Interior Gloss and Semi-Gloss

Specification: TT-P-1511. Paint shall contain no lead, chromium or cadmium pigments, or lead driers. No mercurial compounds shall be used in the fungicide.
Colors: 27875 White
14110 Dark Building Green

FORMULA No.12, Elastomeric, Vapor Barrier

Paint: Quantitative Requirements shall be as follows:

Tests will be as indicated below:

Weight per gal. in lb. (L in kg)
at 72°F (23°C) ASTM D 1475.....8.2 lb. (0 .98 kg) minimum
Total Solids, by weight, percent (ASTM D 2369) .....36 minimum
Viscosity at 77°F (25°C), Krebs Units (ASTM D 562).....65-95
Dry Time, set-to-touch, 1.5 wet mils (0.038 wet mm) Federal
Method Standard No. 141a, Method 4061-1.....30 min max.
Scrub Resistance, 6 wet mils (0.15 wet mm),
ASTM D 2486 .....3000 cycles min
Abrasion Resistance, sand/micron, ASTM D 968 .....5 liters/micron
*Water Retention, AASHTO T 155, gm/sq cm .....0 .055 max.

*Required when material used on damp, uncured concrete surfaces as a one-coat, cure and paint coating.

Color: White and Tints

FORMULA No. 13, Paint, Acrylic Emulsion, Flat

Specification: TT-P-19. Paint shall contain no lead, chromium or cadmium pigments, or lead driers.

Colors: 37875 White
36492 Gray, made by adding Carbon Black to White 37875
34672 Light Building Green

FORMULA No. 14, Primer, Zinc Rich

Specification: SSPC Paint 20, Type II Organic. The zinc dust pigment shall conform to the purity requirements of ASTM D 520, Type II.

707.03 Certification. For quantities in excess of 5 gal. (20 L) of any one formulation, the Contractor shall furnish a manufacturer's certificate as provided in Subsection 106.04.

707.04 Identification and Marking. Each container shall be plainly marked as to contents. Marking shall show color, formula number, quantity, batch number, lot number as required.

SECTION 708 - METALS

708.01 General. When metal is placed in the work, it shall be free from dirt, detrimental scale, paint, oil, or other foreign substance. Thin powdery rust and tight rust are not considered detrimental except in the case of pre-stressing reinforcement.

708.02 Reinforcing Steel. Welded Wire-Fabric for Reinforcement shall conform with the requirements of AASHTO M 55 (M 55 M). Unless otherwise specified other reinforcing steel shall conform with the requirements of AASHTO M 31 Grade 40 or 60 (M 31 M, Grade 300 or 420).

Epoxy coated metal reinforcement shall conform to AASHTO M 284M (M 284M) with the following exception:

Use of colors in shades of brown which inhibit visual detection of rust spots and damage are prohibited.

Reinforcing steel required to be epoxy coated shall be coated in a plant certified by the Concrete Reinforcing Steel Institute (CRSI) as a fusion bonded epoxy applicator.

708.03 Dowel Bars. Dowel bars shall conform to AASHTO M 254 except the steel material may conform to AASHTO M 31 M (M31M) as an alternative. Dowel bars shall be smooth.

Epoxy coated dowel bars shall be coated in a plant certified by the Concrete Reinforcing Steel Institute (CRSI) as a fusion bonded epoxy applicator.

708.04 Tie Bars. Tie bars shall conform to AASHTO M 31 M, Grade 40 or 60 (M 31, Grade 300 or 420). Tie bars shall be deformed and epoxy coated.

708.05 Pre-stressing Steel. Pre-stressing steel shall be high-tensile wire strand conforming to ASTM A416, or uncoated high-strength steel bars conforming to ASTM A722, including all Supplementary Requirements.

All pre-stressing steel in the same direction in any individual member shall be of the same type, unless otherwise permitted by the Engineer.

When bars are to be extended by the use of couplers, the assembled units shall have a tensile strength of not less than the manufacturer's minimum guaranteed ultimate tensile strength of the bars. Failure of any one sample to meet this requirement will be cause for rejection of that heat of bars or lot of couplers or both, depending on the nature of failure. The location of couplers in the member shall be subject to approval by the Engineer.

Whenever threaded studs, bolts, nuts and washers are specified to conform to ASTM Designation: A 307, A 325 (A 325 M), A 449 or A 563 M (A 563 M), and galvanizing is required, they shall be hot-dip zinc coated or mechanically zinc coated in accordance with the requirements of said ASTM Designations.

708.06 Structural Steel and Related Materials

1. **Structural Steel.** Structural steel shall be:

   Structural carbon steel, AASHTO M 270 (M 270 M) Grade 36 (Grade 250);

   Structural low alloy steel, AASHTO M 270 (M 270 M), Grade 50 (Grade 345);

Structural low alloy weathering steel, AASHTO M 270 (M 270 M), Grade 50 W (Grade 345 W);

Structural high strength steel, AASHTO M 270 (M 270 M), Grade 100 (Grade 690);

Structural high strength weathering steel, AASHTO M 270 (M 270 M), Grade 100 W (Grade 690 W).

Unless otherwise specified, structural steel rolled shapes and plates shall be fabricated of structural carbon steel.

All structural carbon steel, structural low alloy steel and structural low alloy weathering steel shall be other than rimmed or capped steel.

If the Contractor elects to use AASHTO M 270 (M 270 M), Grade 50W (Grade 345 W) steel, he shall provide the Engineer with a proof of weldability prior to fabrication.
All plates shall be cut so that direction of rolling is approximately parallel with the direction of tensile or compression stress; the direction of rolling shall be shown on the shop drawings.

Base materials for Fracture Critical Members (FCMs) shall comply with Article 9, AASHTO M 160 (M 160 M) with the following modifications: Paragraphs 9.2.1, 9.2.2, 9.2.2.1, 9.2.2.2 and 9.2.3 shall be deleted and replaced with the following:

9.2.1 Welding shall not be permitted to correct plate surface defects. Plates may be conditioned by complete removal of imperfections or depressions on the top and bottom surfaces by grinding. Conditioning by grinding shall be subject to the following requirements:

a. Flare 1:5 without abrupt change in contour.

b. The depth of the depression after grinding shall not exceed 10 percent of nominal plate thickness or 1/8 in. (3 mm), whichever is greater.

c. Areas removed by grinding shall not exceed 2 percent of the surface area of the face of the plate where the imperfections are found.

d. After grinding the net plate, cross-sectional area shall not be less than 90 percent of the nominal cross-sectional area of the plate.

9.2.2 The edges of plates may be conditioned by the Contractor (Fabricator) to remove injurious imperfections in accordance with paragraph 3.2.3 of the current ANSI/AASHTO/AWS D1.5 Bridge Welding Code.

Longitudinal Charpy V-Notch (CVN) tests are mandatory for acceptance on all plates and shapes used for flanges and webs of main girders, including their splice plates, transverse and longitudinal stiffeners, floorbeams and any plate or shape identified as fracture critical.

Sampling procedures shall conform to the provisions of AASHTO T243 (T243M). The H (Heat) Frequency of testing shall be used for structural steels conforming to AASHTO Designations M270 (M 270 M), Grades 36, 50 and 50W (Grades S 250, 345, and 345 W). The P (Piece) Frequency shall be used for steels conforming to AASHTO M270 (M 270 M), Grade 100/100W (Grade 690/690 W), and any plate or shape identified as fracture critical. Testing shall be performed in accordance with AASHTO T244 and all cost shall be considered as incidental to the cost of the structural steel.

CVN impact values shall conform to the zone requirements specified on the plans.

2. Bolts.

a. *General.* Unfinished bolts (ordinary machine bolts) shall conform to the specification requirements of ASTM A307. They shall be grade A, unless otherwise specified in the plans or special provisions.

Turned bolts or other special bolts shall be made from structural carbon steel as specified in the remainder of this section, unless specified otherwise on the plans or in the special provisions.

High strength bolts shall conform to the requirements of AASHTO M 164 (M164 M) or AASHTO M 253 (M253 M). AASHTO M 164 (M164 M), Type 2, and AASHTO M 253 (M253 M) bolts shall not be galvanized.

The maximum tensile strength shall be 150 ksi (1035 MPa) for bolts 24 mm or less in diameter and 120 ksi (828 MPa) for larger bolts.

When AASHTO M 164 (M164 M) bolts are to be used unpainted and nongalvanized, Type 3 bolts shall be furnished. Nuts and washers used with Type 3 bolts shall have comparable atmospheric corrosion resistance and weathering characteristics.

When AASHTO M 164 (M164 M) bolts are to be galvanized, the steel shall conform to the AISI 10XX series and shall have a maximum yield strength of 105 ksi (724 MPa). AASHTO M 164 (M164) anchor bolts which are 1 in. (25 mm) in diameter or smaller and have a yield stress greater than 105 ksi (724 MPa) shall not be galvanized; however, they may be used provided they are painted with two coats of zinc rich paint, with the Formula as specified in the plans, and consisting of 2 mils (0.06 mm) minimum dry thickness per coat. For galvanized fasteners the nuts should be overtapped to the minimum amount required for the fastener assembly. The amount of overtap in the nut shall be such that the nut will assemble freely on the bolt in the coated condition and shall meet the mechanical requirements of AASHTO M 291 (M291 M) and the rotational-capacity test herein (the overtapping requirements of AASHTO M 291 Paragraph 7.4 (M291 M, paragraph 7.8), shall be considered maximum values instead of minimum).

All bolts, nuts and washers are to be marked with a symbol identifying the manufacturer as required in AASHTO M164, Section 16; AASHTO M253, Section 18; ASTM A194, Section 12; and ASTM F436, Section 14 (M 164M, Section 16; AASHTO M 253M, Section 18; AASHTO M 291M, Section 11, AASHTO M 292/292M, Section 14; and AASHTO M 293, Section 15). The supplier shall provide the symbol and address of each manufacturer for all the bolts, nuts and washers supplied to the project.

b. *Testing*

(1) Bolts

Proof load tests (ASTM F606, Method 1) are required. Minimum frequency of tests shall be as specified in AASHTO M 164 (M164 M), paragraph 9.2.4.

Wedge tests on full size bolts (ASTM F606, paragraph 3.5) are required. If bolts are to be galvanized, tests shall be performed after

galvanizing. Minimum frequency of tests shall be as specified in AASHTO M 164 (M164 M), paragraph 9.2.4.

If galvanized bolts are supplied, the thickness of the zinc coating shall be measured. Measurements shall be taken on the wrench flats or top of bolt head.

(2) Nuts

Proof load tests (ASTM F606, paragraph 4.2) are required. Minimum frequency of tests shall be as specified in AASHTO M291 (M291 M), paragraph 9.3, or AASHTO (M292), paragraph 7.1.2.1. If nuts are to be galvanized, tests shall be performed after galvanizing, overtapping and lubricating.

If galvanized nuts are supplied, the thickness of the zinc coating shall be measured. Measurements shall be taken on the wrench flats.

(3) Washers

If galvanized washers are supplied, hardness testing shall be performed after galvanizing. (Coating shall be removed prior to taking hardness measurements.)

If galvanized washers are supplied, the thickness of the zinc coating shall be measured.

(4) Assemblies

Rotational-capacity tests are required and shall be performed on all black or galvanized (after galvanizing) bolts, nut, and washer assemblies by the manufacturer or distributor prior to shipping. Washers are required as part of the test even though they may not be required as part of the installation procedure.

The following shall apply:

(a) Except as modified herein, the rotational-capacity test shall be performed in accordance with the requirements of AASHTO M 164 (M164 M).

(b) Each combination of bolt production lot, nut lot and washer lot shall be tested as an assembly. Where washers are not required by the installation procedures, they need not be included in the lot identification.

(c) A rotational-capacity lot number shall be assigned to each combination of lots tested.

(d) The minimum frequency of testing shall be two assemblies per rotational-capacity lot.

(e) The bolt, nut and washer assembly shall be assembled in a Skidmore-Wilhelm Calibrator or an acceptable equivalent device. (Note: This requirement supersedes the current AASHTO M 164 (M164 M) requirement that the test be performed in a steel joint.) For short bolts which are too short to be assembled in the Skidmore-Wilhelm Calibrator, see paragraph 4.(i) below.

(f) The minimum rotation, from a snug tight condition (10 percent of the specified proof load), shall be:

Bolt Length	**Nut Rotation**
<4D	240° or 2/3 turn
>4D and <8D	360° or 1 turn
>8D	480° or 1 1/3 turn

D is nominal bolt diameter

(Note: These values differ from AASHTO M164M (M164) Section 6.2 values.)

(g) The tension reached at the above rotation shall be equal to or greater than 1.15 times the required installation tension. The installation tension and the tension for the turn test are shown below:

English Units

Diameter (in.) Req. Installation	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
Tension (kips)	12	19	28	39	51	56	71	85	103
Turn Test Tension (kips)	14	22	32	45	59	64	82	98	118

(SI Units)

Diameter (mm)		(16	20	22	24	27	30	36)
Req. Installation Tension (kN)		(91	142	176	205	267	326	475)
Turn Test Tension (kN)		(105	163	202	236	307	375	546)

(h) After the required installation tension listed above has been exceeded, one reading of tension and torque shall be taken and recorded. The torque value shall conform to the following:

$$\text{Torque} \leq 0.25\ PD$$

Where

Torque = measured torque ft.-lb. (N•m)

P = measured bolt tension lb. (N)

D = bolt diameter ft. (m).

(i) Bolts that are too short to test in a Skidmore-Wilhelm Calibrator may be tested in a steel joint. The tension requirement of paragraph 4.(g) above need not apply. The maximum torque requirement of

paragraph 4.(h) shall be computed using a value of P equal to the turn test tension shown in the table in paragraph 4.(g).

(5) Reporting

(a) The results of all tests (including zinc coating thickness) required herein and in the appropriate AASHTO specifications shall be recorded on the appropriate document, and six copies shall be provided to the Engineer.

(b) Location where tests are performed and date of tests shall be reported on the appropriate document.

(6) Witnessing

The tests need not be witnessed by an inspection agency; however, the manufacturer or distributor that performs the tests shall certify that the results recorded are accurate.

The Contractor shall apply three complete bolt, nut and washer assemblies from each lot and size to the Engineer for quality assurance testing.

c. Documentation

(1) Mill Test Report

Mill Test Reports shall be furnished for all mill steel used in the manufacture of the bolts, nuts or washers.

Mill Test Reports shall indicate the place where the material was melted and manufactured.

(2) Manufacturer Certified Test Report(s) (MCTR)

The manufacturer of the bolts, nuts and washers shall furnish test reports (MCTR) for the item furnished.

Each MCTR shall show the relevant information required in accordance with the reporting provisions of this specification.

The manufacturer performing the rotational-capacity test shall include on the MCTR:

The lot number of each of these items tested.

The rotational-capacity lot number.

The results of the tests required in Assemblies subsection.

All pertinent information required in accordance with the reporting provisions of this specification.

A statement that MCTR for the items are in conformance to this specification and the appropriate AASHTO specifications.

The location where the bolt assembly components were manufactured.

(3) Distributor Certified Test Report(s) (DCTR)

The DCTR shall include MCTR above for the various bolt assembly components.

The rotational-capacity test may be performed by a distributor (in lieu of a manufacturer) and reported on the DCTR.

The DCTR shall show the results of all the tests required in Assemblies subsection of this specification.

The DCTR shall also show the pertinent information required in accordance with the reporting provisions of this specification.

The DCTR shall show the rotational-capacity lot number.

The DCTR shall certify that the MCTR is in conformance to this specification and the appropriate AASHTO specifications.

d. Shipping

(1) Bolts, nuts and washers (where required) from each rotational-capacity lot shall be shipped in the same container. If there is only one production lot number for each size of nut and washer, the nuts and washers may be shipped in separate containers.

Each container shall be permanently marked with the rotational-capacity lot number such that identification will be possible at any stage prior to installation.

(2) The appropriate MTR, MCTR, or DCTR shall be applied to the Contractor or owner as required by the Contract Documents.

e. Lubrication

Galvanized nuts shall be checked to verify that a visible lubricant is on the threads.

Black bolts shall be “oily” to the touch when delivered and installed. Weathered or rusted bolts or nuts shall be cleaned and relubricated prior to installation. Recleaned or relubricated bolt, nut and washer assemblies shall be retested in accordance with section (4) Assemblies, above, prior to installation.

3. *Direct Tension Indicators*. Direct Tension Indicators (DTI) shall be fabricated in accordance with ASTM F959 and the following:

For unpainted structures the DTIs shall be mechanically galvanized in accordance with ASTM B695, Class 50. After galvanizing, the DTI shall be coated with a PPG Power Prime 500°F (260°C) epoxy. The DTI shall be electrodeposited with the epoxy, rinsed, and baked at 350° to 500°F (177° to 260°C) for 20 minutes. The final thickness of epoxy shall be 1 mil (0.025mm) and black in color.

The galvanizing and epoxy coating process shall be done by the manufacturer of the DTI or under their direct supervision.

4. *Stud Connectors.* Stud connectors shall be produced by cold heading, cold rolling, or cold machining. Finished stud connectors shall be of uniform quality and free of injurious laps, fins, seams, cracks, twists, bends, or other defects. Studs shall not have cracks or bursts deeper than one-half the thickness from the periphery of the head of the shaft. Tensile strength of stud connectors shall be determined by test of bar stock after drawing or of full diameter finished studs at the option of the Contractor. Strength requirements shall conform to the following:

Tensile Strength	Elongation	Reduction of Area
Min. = 60,000 psi (414 MPa)	Min. = 20 percent in 2 in. (50 mm)	Min. = 50 percent

Stud connectors shall be furnished with arc shields (ferrules) of resistant ceramic or other suitable material for welding.

Stud connectors shall be shop welded unless shown otherwise on the plans or approved by the Engineer. Qualification, welding, and test procedures shall conform with the current ANSI/AASHTO/AWS D1.5 Bridge Welding Code.

5. *Steel Castings.* Steel castings shall conform to the requirements of AASHTO M103, Grade 70-36 (M103 M, Grade 485-250) unless otherwise specified in the plans or special provisions. All castings shall be heat-treated by normalizing and tempering after the castings have been allowed to cool from the pouring temperature to below the transformation range.

Charpy impact properties shall be determined on each heat from a set of three Charpy V-notch specimens made from a test coupon in accordance with ASTM A370 Methods and Definitions and tested at 70°F (21°C) and have a minimum of 25 ft.-lb. (34 J) of energy.

The entire base plates, webs, and pin sockets shall be inspected by both radiographic and magnetic particle examinations by an independent testing laboratory. Magnetic particle examination shall be performed in accordance with ASTM E709. Radiographic examination shall be judged in accordance with ASTM E94 and types and degrees of discontinuities shall be judged in accordance with ASTM E186. Copies of all radiographic negatives shall be supplied to the Engineer.

The acceptable surface discontinuities and finish shall be in accordance with ASTM A802 unless otherwise specified on the plans. Unacceptable visual discontinuities shall be removed and their removal verified by visual examination of the resultant cavities.

Defects in the opinion of the Engineer that cannot be removed without adversely affecting the casting will be cause for rejection of the entire casting. Defects that can be removed without injury to the casting may be repaired by welding in accordance with ASTM A488. A complete weld procedure shall be submitted to the Engineer for review and approval prior to starting any repair work. The weld procedure shall include but not be limited to base metal preparations, pre-heat, electrode, postheat and procedure qualifications. All repair welding shall be subjected to radiographic and magnetic particle examination.

6. *Steel Forgings.* Steel forgings from which pins, rollers, trunnions, or other forged parts are fabricated shall be made of the class of forged steel specified on the plans. They shall be turned accurately to the detailed dimensions, smooth, straight, and flawless. The final surface shall be produced by a finishing cut. Final machined surfaces shall be machined to a finish of ASA 3 micrometers (125 micro in.) or better unless otherwise specified on the plans.

708.07 Subsection not used

708.08 H-Beam Piles. H-beam piles shall be structural steel and shall conform to ASTM A 36 (A 36 M). Contractor shall furnish the Engineer with two certified copies of the records of ladle analysis and physical tests.

708.09 Barbed Wire. Barbed wire shall conform to AASHTO M 280.

708.10 Woven Wire. Woven wire shall conform to ASTM A116, except wire size and strength options are limited to the following subsections of Table 1 of A116: No. 12 1/2 Grade 60, No. 12 1/2 Grade 125, or No. 14 1/2 Grade 125. Fence height, wire spacing, and stay spacing shall be as specified in the contract.

708.11 Hardware for Barbed or Woven Wire Fence. Staples shall be 9 gage (3.76 mm) with a minimum length of 1.5 in. (38 mm), except that 1 in. (25 mm) staples may be used in locust posts. Stay wire shall be 9.5 gage (3.50 mm), brace wire 9 gage (3.76 mm), and tie wire and wire clamps 12.5 gage (2.51 mm). Stay wire, brace

wire, tie wire and wire clamps shall conform to ASTM A 116. The wire shall be galvanized; no coating class is specified.

708.12 Metal Posts for Barbed or Woven Wire Fences. Painted or galvanized metal fence posts shall meet the requirements of AASHTO M 281 or ASTM A702. Punched lug-type posts will not be accepted.

708.13 Chain Link Fence. Chain link fabric shall be a 2 in. (50 mm) diamond mesh woven from coated wire 11 gage (3.05 mm). The weight of coating for galvanized fabric shall be 1.2 oz./SF (366 g/m^2). Posts, braces, tension wire, fittings and other hardware shall conform to the following: (See chart in Subsection 708.16, Chain Link posts and Braces.)

Class 1 Pipe sections shall conform to ASTM F1083, Schedule 40.

Class 2 Pipe sections shall meet outside dimension requirements of Schedule 40 and have minimum yield strength of 50,000 psi (345 MPa). Class 2 pipe shall be hot dip zinc coated with a minimum of 0.9 oz./SF (274 g/m^2) of exterior surface, over-coated with clear acrylic. Pipe interior surface shall be coated with hot dip zinc or zinc rich paint to a minimum thickness of 0.3 mils (7.62 micrometers).

Either Class 1 or 2 posts and braces may be used. Only one of these alternates may be used within the limits of the project.

C-Sections shall have a minimum yield strength of 45,000 psi (310 MPa). Coating of C-Sections shall be the same as Class 1 or Class 2 pipe.

Other post and brace types may be proposed, conforming to Federal Specification RR-F-191/3C, and subject to review and approval by the Engineer.

Tension wire shall be 3/16 in. (4.5 mm) diameter and 1.2 oz./SF (366 g/m^2) zinc coating. All fencing, fittings, and hardware, unless otherwise specified, shall meet the requirements of AASHTO M 181.

708.14 Steel Guardrails and Fittings. The beams shall meet the specifications for AASHTO M 180, Class A, Type I.

The rail element shall not deflect more than 5.5 in. (140 mm) when tested as a simple beam with the traffic face up and with a 2,000 lb. (900 kg) load applied at the center of a 12 ft. (3.66 m) clear span, through a 3 in. (75 mm) wide flat bearing.

Bolts, nuts and washers used with steel beam guardrail shall conform to ASTM A 307 or A 325 (A 325 M), except that rail splice bolts shall be button headed as shown on the plans. Bolts, nuts, washers and other fittings used with steel beam guardrail shall be galvanized in accordance with ASTM A 153.

708.15 Mile post or Kilometer post Plates. Plates shall be fabricated from 0.08 in. (2 mm) finished flat aluminum sheet conforming to ASTM B 209 M (B 209), Alloy 6061-T6, with an alodine 1200 finish.

Milepost or kilometer post plates shall have a green reflectorized background and white reflective legends and borders.

Milepost or kilometer post plates may be fabricated with green silk screen paste or cutout direct applied white reflective sheeting legends and borders.

Milepost or kilometer post plates shall be visually matched with and within the limits of the current Color Tolerance Chart - highway green, prepared by the U.S. Department of Transportation, Federal Highway Administration.

708.16 Rigid Posts for Delineators, Snow Poles, and Milepost or Kilometer posts. Steel posts for delineators shall weigh a minimum of 1.12 lb./ft. (1.67 kg/m) and shall conform to ASTM A 499; they shall be coated with a deep green, baked-on enamel finish.

Aluminum posts for delineators shall have a minimum thickness of 0.094 in. (2.39 mm) and shall conform to ASTM B 221 M (B 221), Alloy 6061-T6 or 6063-T6.

Steel posts for mile or kilometer posts shall conform to ASTM A 1011 (A1011 M) Grade 45 minimum, ASTM A 653 (A 653 M), G 90, and ASTM (A 513). The thickness shall be 12 gage (2.67 mm).

CHAIN LINK POSTS AND BRACES

Fence Height		Pipe Section		C-Section (Class does not apply)	
		Min Size in. o.d. (mm o.d.)	Min Weight lb./ft. (kg/m)	Min Size in. (mm)	Min Weight lb./ft. (kg/m)
Line Posts					
6 ft. (1.8 m) or Less	Class 1	1.9 (48.3)	2.72 (4.0)	1.875 x 1.625 (48 x 41)	1.85 (2.7)
	Class 2	1.9 (48.3)	2.28 (3.4)		
8 ft. (2.4 m) or Less but > 6 ft. (1.8 m)					
	Class 1	2.375 (6.0)	3.65 (5.4)	1.875 x 1.625 (48 x 41)	2.28 (3.4)
	Class 2	2.375(6.0)	2.28 (4.6)		
Corner and End Posts					
1.8 m (6 ft.) or Less	Class 1	60 (2.375)	5.4 (3.65)	-	-
	Class 2	60 (2.375)	4.6 (2.28)		
2.4 m (8 ft.) or Less but > 1.8 m (6 ft.)					
	Class 1	73 (2.875)	8.6 (5.79)	-	-
	Class 2	73 (2.875)	6.9 (4.64)		
Braces					
All Heights	Class 1	42 (1.66)	3.4 (2.27)	41x 32 (1.625 x 1.25)	2.0 (1.35)
	Class 2	42 (1.66)	2.7 (1.82)		

708.17 Steel and Aluminum Sign Supports.

A. *Ground-Mounted Sign Supports*

Steel for types A and B sign posts shall conform to ASTM A 36 (except ASTM A 283).

Steel posts for Type E sign posts shall conform to ASTM A1011, Grade 45 minimum (A1011 M, Grade 310 minimum), ASTM A653M G 90 (A653 M), and ASTM A513. E1 posts shall be 12 gage (2.67 mm). E2 posts shall be 10 gage (3.43 mm).

Structural steel for brace angles and brackets shall conform to ASTM A 36 (A 36 M). High strength bolts, nuts and washers for all sign posts shall conform to ASTM A 325 (A 325 M). Anchor bolts shall conform to AISI 1144.

Shop fabrication of all steel supports, brace angles, and brackets shall be complete prior to galvanizing. No field modification that damages the galvanization shall be allowed.

Nuts and washers for anchor bolts shall conform to ASTM A 325 (A 325 M).

B. *Overhead Sign Structures*

The sign structure components shall be fabricated from material conforming to the following applicable specifications:

Steel Structure	**Aluminum Structure**
ASTM A 36 (A 36 M) (Except ASTM A 283)	ASTM B 308 (B 308 M), Alloy 6061-T6
ASTM A 53, Types E & S, Grade B	ASTM B 429, Alloy 6063-T6
ASTM A 325 (A 325 M)	ASTM B 209 (B 209 M), Alloy 2024-T4

The end poles, mastarms, or truss assemblies shall be formed into a continuous shaft. Pole shafts shall be uniformly straight, with a permissive variation not to exceed 3/4 in. (19 mm), measured at the midpoint of the pole in place and unloaded.

Aluminum bolts shall have an anodic coating 0.0002 in. (0.005 mm) minimum thickness with a dichromate or boiling water seal, and shall be coated with a suitable lubricant.

The Contractor may furnish the overhead sign structures fabricated entirely from

steel, or aluminum, provided only one type is furnished on the project. All structures shall be of like manufacture.

Only approved splices for the overhead steel sign structure will be permitted.

Shop fabrication of overhead steel sign structures, posts and brackets shall be complete prior to galvanizing. Any damaged galvanized surface shall be repaired as follows:

1. The damaged area shall be thoroughly cleaned and all traces of welding flux and loose or cracked spelter removed.

2. The cleaned area shall then be painted with two coats of zinc dust-zinc oxide paint.

C. *General*

All structural steel shall be galvanized in accordance with ASTM A 123. All miscellaneous steel hardware shall be zinc coated steel in accordance with ASTM B 633, Class No. Fe/Zn 25, Type III coating. All steel square tubes (type E Signposts) shall be galvanized in accordance with ASTM A653 (A653M) A653 G 90.

Anchor bolts shall be furnished with two nuts and required washers. The nuts, washers and no less than 10 in. (250 mm) of the threaded end of the anchor bolts shall be galvanized in accordance with ASTM A153. After galvanizing, the anchor bolt threads shall accept galvanized nuts without tools or causing removal of the protective coating.

708.18 Hardware for Signs. Bolts, nuts, washers and other hardware items used for fabrication and mounting of signs shall be zinc coated steel, or aluminum, and shall conform to the following applicable specifications:

Electrodeposited Coatings of Zinc on Iron and Steel..... ASTM B 633
Class No. Fe/Zn 25
Type III Coating

Low or Medium Carbon Steel Externally or
Internally Threaded Standard Fasteners .....SAE J429 or SAE J995
both Grade 2

Alloy-Steel Bolting Materials for
Low-Temperature Service .....ASTM A 320 (A 320 M)
Aluminum-Alloy Sheet and Plate .....ASTM B 209 (B 209 M)
Flat washers .....ASTM B 221 M (B221) Alloy Alclad 2024-T4
Aluminum-Alloy Bars, Rods, and Wires .....ASTM B 211 (B 211 M)
Lock nuts .....Alloy 2017-T4
Bolts and screws .....Alloy 2024-T4
or 6061-T6
Nuts 6 mm (1/4 in.) tap and under .....Alloy 2024-T4
Nuts 8 mm (5/8 in.) tap and over .....Alloy 6061-T6
or 6262-T9
Spring lock washers.....Alloy 7075-T6
Aluminum-Alloy Rivet and Cold-Heading Wire
and Rods.....ASTM B 316 (B 316 M)
Blind rivets.....Alloy 2017-F, 2117-F
or 5056-F

708.19 Illumination Poles and Bases. All lighting poles furnished shall be of like manufacture. Shop drawing shall be submitted for approval before fabrication begins. Materials used for fabricating poles shall meet the following specifications:

High Strength Bolts, Nuts and Anchor Bars
Minimum yield strength .....ASTM A 325 (A 325 M)
Minimum tensile strength .....ASTM A 325 (A 325 M)
Mild To Medium-Strength Carbon-Steel
Castings for General Application.....ASTM A-27 (A 27 M)
Cast steel parts .....Grade 65-35 (Grade 485-250)
Structural Steel Sheet .....ASTM A 659 (A 659 M)
ASTM A 572 Gr 55 and ASTM A 1011, Gr 55
Sheet Steel for fabricating shafts, anchor bars and nuts
Welded and Seamless Steel Pipe .....ASTM A 53
Steel pipe for lighting bracket arms
Zinc (Hot-Galvanized) Coatings on Products Fabricated from
Rolled, Pressed, and Forged Steel Shapes,
Plates, Bars and Strips .....ASTM A 123
Galvanizing steel poles
Gray Iron Castings for Valves, Flanges, and Pipe Fittings .....ASTM A 126
Cast iron parts

Zinc (Hot-Dip) on Iron and Steel Hardware .....ASTM A 153
Galvanizing anchor bolts and bracket arms
Aluminum-Alloy Sand Castings or
Permanent Mold Castings .....ASTM B 26 M (B 26 M) or B 108
Aluminum base flanges and transformer bases Alloy A 357.0-T6
Aluminum Die Castings.....ASTM B 85
Alloy 380
Aluminum-Alloy Bars, Rod and Wire .....ASTM B211 M (B 211 M)
Aluminum pole shafts and aluminum lighting bracket arms Alloy 6063-T6

Catalog numbers listed on the plans are provided only for the purpose of indicating general dimensions and configurations. All poles and appurtenances must be capable of supporting wind loads within allowable stress ranges as set forth in the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. All welding shall also conform to the aforementioned AASHTO Specifications.

The pole shall be formed into a continuously tapered shaft having uniform taper of approximately 0.14 in./ft. (11.6 mm/m). Pole shafts shall be straight with a permissive variation not to exceed 1 in. (25 mm) measured at the midpoint, in place, and unloaded. The top of the pole shaft shall be covered with a removable waterproof pole cap. The maximum pole deflection permitted after loading (excluding wind load) shall be equal to 1 percent of the shaft length.

A removable anchor bolt cover or covers shall be secured to the base plate.

The pole shaft shall contain a hand hole with a reinforcing frame and cover. The hand hole shall be located at a minimum of 90° from the bracket arm. A bonding device shall be provided in the lower half of the hand hole reinforcing frame for grounding purposes.

All materials, components and hardware for each pole assembly shall be compatible with the type of pole used.

Steel pole shafts shall be fabricated from sheet steel. The pole wall thickness shall be permanently shown on each pole near the base.

Poles shall be galvanized after all welding is completed.

Aluminum poles shall have a natural finish and be free from all defects. Anchor bases for aluminum poles shall be formed from aluminum alloy and secured to the bottom of the shaft in such a manner as to develop the full strength of the shaft.

Not less than 10 in. (250 mm) of the threaded end of the anchor bolts, and the nuts and washers shall be galvanized. The anchor bolt threads shall accept galvanized nuts without requiring tools or causing the removal of the protective coating.

Threaded hubs for steel poles shall be made of forged steel in conformance with ASTM A 105 (A 105 M). The end of the hub inserted into the pole shaft shall have a minimum 1/4 in. (6 mm) round beveled end or edge to prevent insulation stripping during wire pulling operations. Half pipe coupling, tank spud, etc., will not be permitted for this use.

Safety slip bases shall be the four-bolt configuration. The base shall be designed to meet necessary structural and wind loading requirements and as a minimum shall meet the current breakaway requirements of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals."

Breakaway Support Couplings shall be designed to meet necessary structural and wind loading requirements and as a minimum shall meet the current breakaway requirements of the AASHTO "Standard Specifications for Highway Signs, Luminaires and Traffic Signals." Use of the couplings shall be limited to pole assemblies weighing less than 900 lb. (400 kg) and poles providing 40 ft. (12 m) or less nominal luminaire mounting heights unless higher mounting heights are specifically permitted by the plans.

A 1/16 in. (2 mm) aluminum skirt shall surround the support coupling and be fastened with No. 10 x 5/8 in. (5 mm x 16 mm) stainless steel sheet metal screws.

708.20 Structural Plate Pipe, Pipe Arches and Arches. The material for structural pipe and pipe arches shall conform to AASHTO M 167 or M 219.
Hot dipped or mechanically galvanized bolts and nuts meeting the requirements of ASTM A 449 and ASTM A 563 (A 563 M) will be accepted.

Polymer coated pipe, in addition to meeting the other requirements of 708.20, shall be coated with material meeting polymer coating requirements of AASHTO M 246; except the coating may be shop or field applied after corrugation, and coating thickness shall be a minimum of 0.01 in. (0.25 mm) on each side of the sheet. After

tightening, exposed portions of bolts and nuts (both on soil side and water side of pipe) shall be coated with the same material used on the pipe.

Polymer coated pipe may be substituted for bituminous coated pipe.

When yielding seam (keyhole slotted) pipe is specified to be bituminous coated or polymer coated, mating surfaces in the overlap portion of the joint shall not be coated unless authorized in writing by the pipe manufacturer.

708.21 Metal Aprons. Materials for metal aprons shall conform to AASHTO M 36 (M 36 M) or M 196 (M 196 M).

708.22 Manhole Covers and Rings, Grates, Catch Basins, Inlets, Etc. Castings shall meet the requirements of the plans and AASHTO M 105 for Gray Iron Castings, Class No. 30.

708.25 Aluminum Rail and Fittings. Aluminum guardrail plate and fittings shall conform to the following applicable specifications:

Aluminum-Alloy Sheet and Plate.....ASTM B 209 (B 209 M)
Guardrail Plate and Terminal Plate ....ASTM B 221 (B 221 M) Alloy-Alclad 2024-T3
Washers .....ASTM B 221 (B 221 M) Alloy-Alclad 2024-T4 not anodized
Aluminum-Alloy Bars, Rods, and Wire .....ASTM B 211 (B 211 M)
Bolts .....Alloy 2024-T4, 30 min. anodized and 30 min. seal
Nuts .....Alloy 6061-T6, not anodized

Rail element joints shall have a tensile strength of not less than 80,000 lb. (356 kN). The rail element shall not deflect more than 5.5 in. (140 m) when tested as a simple beam with the traffic face up and with a 2,000 lb. (9 kN) load applied at the center of a 12 ft. (3.66 m) clear span, through a 3 in. (75 mm) wide, flat bearing.

708.26 Extruded Aluminum. Extruded aluminum shall conform to ASTM B 221 M (B 221), Alloy 6061-T6 for porcelain enamel backgrounds and Alloy 6063-T6 for polyester powder coating or reflective sheeting backgrounds. Extrusions shall be flat and true within a tolerance of 1/4 in. per 8 ft. (2.5 mm per m) of panel length. Deviation from flat surface across the width of the panel before coating shall not exceed 0.005 in./in. (0.005 mm/mm) of width. Extruded sections shall be continuous for the length of the signs.

708.27 Sheet Aluminum. Sheet aluminum shall conform to ASTM B 209 M (B 209), Alloy 6061-T6 or 5052-H38 with an alodine 1200 finish. Sheet aluminum used for flat aluminum signs shall have the following minimum thickness:

Type B Signs	-	0.08 in. (2.0 mm)
Type D Signs	-	0.10 in. (2.54 mm)

708.28 Caps for Right-of-way and Street Markers. Caps shall be cast from brass or bronze.

The top of the finished casting shall be free from blowholes, pits, cracks, corrugations, or other surface roughness so as to render completely legible the standard identification and any other letters or numerals which may be subsequently stamped thereon.

Each cap shall be stamped or cast as shown on the plans.

708.29 Self-Lubricating Bronze Bearing Plates. Self-lubricating bronze bearing plates shall be provided with circular recesses which shall be filled with an approved lubricating compound of graphite and metallic substances with a lubricating binder. The compound shall be pressed into the recesses so as to form dense, nonplastic lubricating inserts. The lubricating area shall comprise not less than 25 percent of the total area of the plate.

708.30 Steel Shell Piles. Steel shell piles may be cylindrical, cylindrical with a taper, or step-tapered. Cylindrical shells shall have an outside diameter not less than that shown on the plans. The outside tip diameter of tapered piles shall be a minimum of 8 in. (200 mm) and the outside butt diameter not less than shown on the plans.

Steel shells driven without a mandrel shall be of sufficient strength and rigidity to permit driving to the specified resistance without distortion. The steel shall have a minimum yield strength of 30,000 psi (200 MPa). The Contractor shall furnish 4 copies of a certified test report showing compliance with yield strength requirements. The minimum wall thickness shall be 1/4 in. (6 mm). Shells in exposed pile bents in water shall have a minimum wall thickness of 5/16 in. (8 mm). Unless otherwise specified shells driven without a mandrel shall be equipped with driving points, flat plates, or other suitable end closures, adequately fixed, and of sufficient thickness and strength to permit driving without distortion and remain water tight.

Steel shells driven with a mandrel shall be of sufficient thickness so that the shell will hold its original form after the mandrel is withdrawn and show no harmful distortion after it and adjacent piles have been driven.

708.31 Permanent Metal Concrete Forms. Permanent metal forms for concrete slabs shall be of zinc coated (galvanized) steel sheet conforming to ASTM A 653 M SS designation with coating Designation Z500 (G165), and shall otherwise meet all requirements relevant to steel permanent metal forms and the placing of concrete as specified herein.

SECTION 709 - CONCRETE CURING MATERIALS AND ADMIXTURES

709.01 Membrane-Forming Curing Compound. Membrane-forming curing compounds shall conform to the following requirements as specified:

System 1. AASHTO M 148, Type 1-D, Class B with Fugitive Dye

System 2. AASHTO M 148, Type 2, Class B, White Pigmented

709.02 Concrete Admixtures - General. If more than one admixture is used, said admixtures shall be the same brand from the same manufacturer, shall be compatible, and shall be dispersed in accordance with the manufacturer's recommendations.

709.03 Air Entraining Admixtures. Air entraining admixtures shall conform to AASHTO M 154.

709.04 Set Retarding Admixtures. Set retarding admixtures shall conform to ASTM C 494.

709.05 Water Reducing Admixtures. Water reducing admixtures shall conform to ASTM C 494.

SECTION 710 - TIMBER AND PRESERVATIVES

710.01 Structural Timber and Lumber. Structural timber and lumber shall be Douglas Fir or Larch of the grade as specified in the plans or special provisions. Structural timber and lumber shall be graded using the current version of the Western

Wood Products Association (WWPA) standard grading rules of western lumber. Wood shall be incised and then treated according to American Wood Preservers Association Standards (AWPA) C-14.

710.02 Wood Sign Posts and Snow Poles. Sign posts and snow poles shall be surfaced four sides, and free of wane and decay. Ends shall be cut square and the post shall be incised on all four sides before treating. No checks shall be more than 1/4 in. (6 mm) in width. No twisted pieces shall be accepted, and sweep shall be limited to 1 in. per 10 ft (8 mm/m). Incising requirements shall be as specified in Standard C2 of The American Wood Preservers Association (AWPA) and treated according to Subsection 710.09 - Preservative Treatment.

Sign posts and snow poles shall be untreated Western Red Cedar, treated Douglas Fir or treated Hem-Fir graded using the current version of the of West Coast Lumber Inspection Bureau (WCLIB) or the Western Wood Products Association (WWPA) meeting the following grades and shall meet the following requirements:

Western Red Cedar:

4" x 4"	No. 2 or better per paragraph 124c WCLIB or paragraph 42.12 WWPA.
4" x 6"	No. 2 or better per paragraph 123c WCLIB or paragraph 62.12 WWPA.
6" x 6" or 6" x 8"	Post and Timbers, Select Structural per paragraphs 131a WCLIB or paragraph 80.10 WWPA.

Douglas Fir:

4" x 4"	85% of the sign posts free of heartcenter. Structural Light Framing, No. 2 grade per paragraph 124c WCLIB or paragraph 42.12 WWPA.
4" x 6"	85% of the sign posts free of heartcenter. Structural Joists and Planks, No. 2 grade per paragraph 123c WCLIB or paragraph 62.12 WWPA.
6" x 6" or 6" x 8"	Posts and Timbers, No. 1 grade per paragraph 131b WCLIB or paragraph 80.11 WWPA.

Hem-Fir:	
6” x 6” or 6” x 8”	Posts and Timbers, Select Structural per paragraph 131a WCLIB or paragraph 80.10 WWPA.

All posts shall be inspected and certified in accordance with the designated current grading and dressing rules of the WCLIB or WWPA by providing to the Department at the time of delivery, a certificate of inspection executed by the WCLIB, the WWPA, or the Pacific Lumber Inspection Bureau (PLIB). Certificates of inspection shall identify the destination or F.O.B. for which the material is intended and each piece inspected and certified shall be marked to indicate such inspection. Such certification or grade marking however, shall not constitute final acceptance of the material, and the Departmen may reject any and all lumber or timber that does not comply with the specifications upon delivery.

710.03 Guardrail Posts and Spacer Blocks. Guardrail posts and spacer blocks shall be rough, S2S or S4S. The size tolerance of rough sawn blocks in the direction of the bolt holes shall not be more than ± 1/4 in. (6 mm). Incising requirements shall be as specified in Standard C2 of The American Wood Preservers Association (AWPA) and treated according to Subsection 710.09 Preservative Treatment.

Guardrail post and blocks shall be graded using the current version of the Western Wood Products Association (WWPA) standard grading rules for western lumber and shall meet the following requirements:

Douglas Fir or Larch	No. 1 Grade
Hem-Fir	No. 1 Grade
Pine (Lodge pole, Ponderosa & Idaho White)	No. 1 Grade
Western Red Cedar	No. 1 Grade

If an otherwise acceptable guardrail post has a through check, shake, or end split in the same plane as, or a plane parallel to the plane of the bolt hole and extending from the top of the post to within 3 in. (75 mm) of the bolt hole, the post will be rejected unless it is provided with a tight fastening across the separation, centered 2 in. (50 mm) below the top of the post. The fastening shall be a 1/2 in. (12 mm) diameter galvanized bolt with a galvanized washer under the bolt head and the nut. Holes for fastening shall be treated with preservative.

710.04 Service Poles for Power. Wood poles shall meet the requirements of ANSI No. 05.1. Permissible species are Douglas Fir, Larch, Hemlock and Pine (all species). Poles shall be treated in accordance with Subsection 710.09.

710.05 Timber Piles.

1. Unless otherwise specified, timber piles shall be of first quality Douglas Fir or Western Larch and shall conform with the requirements of ASTM D 25.

2. *Treated Piles.* Piles shall be treated in accordance with Subsection 710.09.

3. *Untreated Piles.* Untreated piles shall have a high heartwood content and the diameter of the heartwood shall be not less than eight-tenths of the diameter of the pile at the butt.

4. *Dimensions.* Unless otherwise specified, piles shall have a diameter at a section 3 ft. (1 m) from the butt and at the tip as shown in the following table:

Length of Piles **ft.** (m)	**Butt Diameter** **in.** (mm)	**Tip Diameter** **in.** (mm)**, minimum**
Under 40 (12)	12-18 (300-460)	8 (200)
40-60 (12-18)	13-18 (330-460)	7 (180)
Over 60 (18)	14-20 (355-510)	6 (150)

The diameter of the piles shall be measured after peeling. When the pile is not exactly round, the average diameters, or the circumference divided by 3.14 shall be used to determine the diameter. For any structure, the butt diameters for the same length of the pile shall be as uniform as practicable.

710.06 Service Poles for Illumination. Poles shall be thoroughly seasoned and treated, 35 ft. (10.7 m) long, rated class 4; shall be machine peeled; and shall conform to ANSI 05.1, except that the number and size of knots and the sweep of the pole shall be two-thirds that permitted by the ANSI specification. Poles shall be treated in accordance with Subsection 710.09.

710.07 Pole Keys. Pole keys shall be thoroughly seasoned and treated, 5 ft. (1.5 m) long, have a 4 in. (100 mm) minimum dimension and a minimum cross-sectional area of 25 sq. in. (16 100 mm^2).

Pole keys shall be treated in accordance with Subsection 710.09.

710.08 Posts for Barbed or Woven Wire Fence. Line posts shall have a minimum post circumference of 10 in. (250 mm) and a minimum distance between

opposite faces or between any face and an opposite corner of 3 in. (75 mm). Posts for corner, terminal, or braces shall have a minimum circumference of 17 1/2 in. (440 mm) and a minimum distance between opposite faces or between any face and an opposite corner of 4 in. (100 mm).

Wood posts shall be pressure treated and may be Douglas Fir, Western Larch, Cedar, or Pine of any species.

710.09 Preservative Treatment. Before preservative treatment, Douglas Fir and West Coast Hemlock posts shall be seasoned to a moisture content of not more than 25 percent as measured at the midpoint of the post in the outer 1in. (25 mm), using an approved type moisture meter, in accordance with ASTM D2016.

Signposts, snow poles, and guardrail posts and blocks shall be shall be pressure treated with pentachlorophenol or copper naphthenate in accordance with the latest version of American Wood Preservers Association Standards (AWPA) P-8, P-9 and C-14, except:

> The minimum retention of the preservative as determined by assay shall be 0.50 pounds per cubic foot of wood for pentachlorophenol and 0.060 pounds per cubic foot of wood for copper naphthenate.

Fence posts shall be pressure treated with pentachlorophenol or copper naphthenate in accordance with the latest of American Wood Preserver's Association (AWPA) C5-00 standard.

> The minimum retention of the preservative as determined by assay shall be 0.40 pounds per cubic foot of wood for pentachlorophenol and 0.055 pounds per cubic foot of wood for copper naphthenate.

Treated posts shall be subject to inspection by the Engineer after arrival at the site. No previous inspection at the plant shall bar rejection.

Certified treating reports shall be furnished for all treated timber products to be shipped. Assay reports shall be furnished for a minimum of one out of four charges shipped. One copy of each treating report and assay report shall be shipped with the posts, and a second copy of each report shall be sent to:

ITD Materials Engineer
PO Box 7129
Boise, ID 83707

Handling and care of pressure treated timber products shall conform to the requirements of AWPA Standard M4.

The treating plant shall imprint legible symbols in the end of all timber products treated indicating the name of the treating company and the type and year of treatment in accordance with AWPA Standard M1 and M6.

At the time of delivery to the job site, all treated posts shall have a moisture content of not more than 25 percent when tested as described above. The posts shall conform in all respects to the specified grading requirements at the time of delivery.

710.10 Preservative Treatment by the Hot-Cold Soaking Method. When called for on the plans, all lumber and timber to be treated by the hot-cold soaking method must be reasonably well seasoned and free from outer and inner bark, dirt, grease, or other objectionable matter which will in any way hinder the free penetration of the preservative. All lumber and timber of 2 in. (50 mm), dimensional stock or larger shall be incised and all framing shall be done before treatment.

The preservative used shall be a 5 percent concentration of pentachlorophenol.

The tanks used shall be of sufficient size to permit complete submergence of the largest timber in any operation and to allow free circulation of the liquid around the timber being treated. Sufficient liquid shall be maintained in the tank to submerge completely the timber to a minimum depth of 6 in. (150 mm). When a number of pieces are being treated at one time, each piece shall be separated from the others on all sides by spacers not less than 1/4 in. (6 mm) in least dimension. Suitable weights or cross bracing shall be provided to keep the material submerged.

The timber or lumber shall be submerged in the cold solution as previously described. The temperature shall be slowly increased for a period of not less than 5 hours to a minimum temperature of 180°F (82°C), and not exceeding 210°F (99°C). After 5 hours and attaining the minimum specified temperature, the timber or lumber shall be permitted to cool in the solution until such time as the minimum specified quantity of preservative is absorbed by the wood.

Timber for minor irrigation structures, unless otherwise shown on the plans, shall be No. 1 common grade of the species permitted, and shall be treated in accordance with the Hot-Cold Soak Process. The species permitted and the minimum retention in pounds per cubic foot (kilograms per cubic meter) required are as follows:

Douglas Fir (Rocky Mountain, Inland, or Coast) .....2.0 lb. (32 kg)
Pine, Yellow (Pinus Ponderosa) .....4.0 lb. (64 kg)
Pine, Lodge Pole (Pinus Contorta) .....4.0 lb. (64 kg)
Cottonwood, Northern Black (Populus Trichocarpa Hastata) .....4.0 lb. (64 kg)

SECTION 711 - MISCELLANEOUS

711.01 Water for Concrete, Grout, and Mortar. Water from any municipal drinking water supply may be used for concrete, grout, or mortar. Water from other sources may be used, provided it is reasonably clear and free from oil and contains less than 1000 parts per million of chlorides and less than 1000 parts per million of sulfates, determined in accordance with AASHTO T26. If a water source other than a municipal drinking water supply is proposed by the Contractor, the Contractor shall furnish independent laboratory test reports verifying compliance with these chemical requirements. Such reports shall be furnished prior to use and shall be no more than two years old.

711.02 Elastomeric Bearings.

1. Description

   Elastomeric bearings as herein defined shall include unreinforced pads (consisting of elastomer only) and reinforced bearings with steel laminates.

   Stacking of individually laminated pads will not be permitted.

   Bearings shall be furnished with the dimensions, material properties, elastomer grade and type of laminates as shown on the plans. In the absence of more specific information, bearings shall be Grade 3, 60-durometer Polychloroprene, and steel reinforced.

2. Materials

The elastomeric compound shall meet the minimum requirements of AASHTO M 251-90 and those provided herein. Test requirements may be interpolated for intermediate hardnesses. The material shall be specified by its hardness and the Shear Modulus shall fall within the ranges listed:

50 Durometer = 95 to 130 psi (650-900 kPa)
60 Durometer = 130 to 200 psi (900-1380 kPa)
70 Durometer = 200 to 300 psi (1380-2070 kPa)

A consistent value of hardness shall also be supplied for the purpose of defining limits for the tests in AASHTO M 251-90 Table 1. When test specimens are cut from the finished product, the physical properties shall be permitted to vary from those specified by 10 percent. All material tests shall be carried out at 73°F ± 4°F (23°C ± 2°C) unless otherwise noted. Shear modulus tests shall be carried out in conformance with the AASHTO M 251-90 section 9.2.

Steel laminates used for reinforcement shall be have a minimum nominal thickness of 16 gage (1.6 mm).

Physical properties of materials are provided in AASHTO M 251-90 Table 1 as well as modifications provided for herein;

Minimum tensile strength of elastomeric bearings shall be 2500 psi (17.2 MPa).

The elastomer compound shall be classified for temperature as grade 3 or 4. The grades are defined by the testing required in section 5(b). A higher grade of elastomer may be substituted for a lower one.

3. Fabrication

Laminated pads shall consist of alternate layers of elastomer and metal bonded together. They shall have reinforcement every 1/2 in. (12 mm) through the entire thickness. The top and bottom layers of reinforcement shall be uniformly covered with 1/8 in. (3 mm) of elastomer. The edges of metal reinforcement shall be fully coated with 1/4 in. (6 mm) of elastomer.

4. Fabrication Tolerances

Plain pads and laminated bearings shall be built to the specified dimensions within the following tolerances of AASHTO M 251-90 Table 2.

5. Testing

Materials for elastomeric bearings and the finished bearings themselves shall be subjected to the tests described in the AASHTO M 251-90 and this section. Material tests shall be in accordance with the AASHTO M 251-90 Table 1.

a. Ambient Temperature Tests on the Elastomer

The elastomer used shall at least satisfy the limits prescribed in the AASHTO M 251-90 Table 1 for durometer hardness, tensile strength, ultimate elongation, heat resistance, compression set, and ozone resistance. The shear modulus of the material shall be tested at 73°F (23°C) using the apparatus and procedure described in the AASHTO M 251-90 section 9.2 and shall fall within the range for its specified hardness.

The ambient temperature tests on the elastomer described above shall be conducted for the materials used in each lot of bearings. In lieu of performing a shear modulus test for each batch of material, the manufacturer may elect to provide certificates from tests performed on identical formulations within the preceding year. Test certificates from the supplier shall be provided for each lot of reinforcement.

b. Low Temperature Tests on the Elastomer

Grades 3 and 4 elastomers shall be subjected to low temperature brittleness tests (ASTM D746), instantaneous low temperature stiffness tests (ASTM D1043), and low temperature crystallization tests (ASTM D4014). The three low temperature tests on the elastomer described above shall be conducted on the material used in each lot of bearings for grades 3 and 4 material. For grade 3 material, in lieu of the low temperature crystallization test, the manufacturer may choose to provide certificates from low-temperature crystallization tests performed on identical material within the last year.

Low Temperature Brittleness Test; the specimen shall be loaded to no failure. Grade 3 material shall be tested at -40°F (-40°C) and grade 4 shall be tested by procedure B at -55°F (-48°C).

Instantaneous Thermal Stiffening Test; stiffness shall not exceed 4 times the stiffness measured at 73°F (23°C). Bearings shall be tested at -40°F (-40°C) for grade 3 and -50°F (-46°C) for grade 4.

Low Temperature Crystallization Test; test specimens shall have stiffness at test time and temperature less than 4 times the stiffness measured at 73°F (23°C) with no time delay. The stiffness shall be measured with the quad shear test rig in an enclosed freezer unit as described in annex A of ASTM D4014. The test specimens shall be taken from randomly selected bearings. A 25 percent strain cycle shall be applied within a period of 100 seconds. The first three quarters cycle of strain shall be discarded and the stiffness shall be determined by the slope of the force deflection curve for the next half cycle of loading. Bearings of grade 3 shall be tested for 14 days at -15°F (-26°C) and for grade 4 bearings shall be tested for 21 days at -35°F (-37°C).

c. Visual Inspection of the Finished Bearing

Every finished bearing shall be inspected for compliance with dimensional tolerances and for overall quality of manufacture. In steel reinforced bearings, the edges of the steel shall be protected everywhere from corrosion.

d. Short-Duration Compression Tests on Bearings

Every steel reinforced bearing shall be loaded in compression to 1.5 times its maximum design load. The load shall be held constant for 5 minutes, removed, and reapplied for another 5 minutes. The bearing shall be examined visually while under the second loading.

If the bulging pattern suggests laminate parallelism or a layer thickness that is outside the specified tolerances, or poor laminate bond, the bearing shall be rejected.

If there are three or more separate surface cracks that are greater than 0.08 in. (2 mm) wide and 0.08 in. (2 mm) deep, the bearing shall be rejected.

e. Long-Duration Compression Tests on Bearings

From each lot of bearings, either designed by Bridge Design Manual Method B or made from grade 4 elastomer, a random sample shall be subjected to the long-term load test described below. The sample shall consist of at least one bearing chosen randomly from each size and material batch and shall comprise at least 10 percent of the lot. If one bearing of the sample fails, all the bearings of that lot shall be rejected, unless the manufacturer elects to test each bearing of the lot at his expense. In lieu of this procedure, the Engineer may require every bearing of the lot to be tested.

The bearing shall be loaded in compression to 1.5 times its maximum design load for a minimum period of 15 hours. If, during the test, the load falls below 1.3 times the maximum design load, the test duration shall be increased by the period of time for which the load is below this limit. The bearing shall be examined visually at the end of the test while it is still under load. If the bulging pattern suggests laminate parallelism or a layer thickness that is outside the specified tolerances, or poor laminate bond, the bearing shall be rejected. If there are three or more separate surface cracks that are greater than 0.08 in. (2 mm) wide and 0.08 in. (2 mm) deep, the bearing shall be rejected.

f. Shear Modulus Tests on Material from Bearings

The shear modulus of the material in the finished bearing may be evaluated, at the discretion of the Engineer, by testing a specimen cut from it using the apparatus and specified by AASHTO M 251-90 Section 9.2, or a comparable nondestructive stiffness test may be conducted on a pair of finished bearings. The shear modulus shall fall within the range for it's specified hardness listed in Section 711.02. If the test is conducted on finished bearings, the material shear modulus shall be computed from the measured shear stiffness of the bearings, taking due account of the influence on shear stiffness of bearing geometry and compressive load.

6. Installation

Bearings shall be placed on surfaces that are plane to within 0.08 in. (2 mm) and horizontal to within 0.005 radians.

Exterior plates of the bearing shall not be welded unless at least 1.5 in. (38mm) of steel exists between the weld and the elastomer. In no case shall the elastomer or the bond be subjected to temperatures higher than 400° F (204° C).

711.03 Polytetrafluoroethylene(TFE/PTFE) Bridge Bearing Pads. TFE/PTFE pads and stainless steel mating surface where specified or shown on plans shall conform with current AASHTO Specifications for Highway Bridges. If filled TFE/PTFE sheet is used, only glass-fiber filler will be permitted.

711.04 Riprap. Material for this work shall be durable, angular field or quarry stones of approved quality, sound, hard, free from seams and other structural defects from an approved source, suitable salvaged concrete, or concrete in sacks. Material shall be resistant to weathering and water action and conform to the following requirements:

Property	Test Method	Requirement
Apparent Specific Gravity	AASHTO T 85	2.5 min.
Absorption	AASHTO T 85	4 % max.
Coarse Durability Index	AASHTO T 210	52 min.

The grading of the riprap shall be determined by visual inspection of the load before it is placed.

1. *Loose Riprap.* Loose riprap shall meet the following requirements for grading:

   The stone shall be nearly rectangular, approximately 50 percent having a volume greater than 1 CF (0.03 m^3). The maximum size shall not exceed the minimum depth of riprap as specified on the plans.

2. *Hand Placed Riprap.* The stone shall be nearly rectangular, approximately 40 percent having a volume greater than 1 CF (0.03 m^3). No stone shall be used which is less than 6 in. (150 mm) thick.

3. *Sack Riprap.* Sack riprap shall consist of Class 15 (Class 10.5) concrete as specified in Subsection 502.02.

4. *Concrete Stabilized Riprap.* Stone for this item shall conform to 1 or 2 above.

Concrete for this item shall be Class 15 (Class 10.5) as specified in Subsection 502.02.

711.05 Seed. Seed furnished shall be labeled; true as to variety; noxious weed-free; and meet all purity, germination specifications, and standards of the Federal Seed Act and Idaho State Seed Laws. Substitutions for seed not available for purchase shall receive prior approval from the Engineer.

711.06 Plants. Plants shall be true to type and name in accordance with Standard Plant Names prepared by the American Joint Committee on Horticultural Nomenclature. Plants shall conform to the applicable requirements of USA Standard for Nursery Stock.

Plants shall be free from disfiguring knots, sun scald, abrasions of the bark, wind or freezing damage, or other disfigurements. Plants shall not be cut back from larger sizes to meet specified sizes. Plants shall be free of plant diseases and insect pests.

Trees shall have straight trunks, well-ranched with symmetrical tops. Trees shall have no unhealed scars more than 3/4 in. (20 mm) diameter. The presence of noxious weeds at the source or in the containers may be cause for rejection of plants.

Plants shall be nursery grown unless collected plants are specified.

The term "nursery grown" shall include collected woods-grown or natural seedling trees and shrubs, provided such trees and shrubs have been growing continuously in one nursery for the following minimum periods of time:

Plant Material	Time in Nursery
Trees	2 Growing Seasons
Shrubs, Evergreens	2 Growing Seasons
Shrubs, Deciduous	1 Growing Season
Vines	1 Growing Season

Plants not properly established or root bound in containers will not be accepted. Plants furnished in pots or containers shall be of a size specified in the plans.

Deciduous plants may be supplied bare-root (B.R.) unless specified otherwise. Plants furnished bare-root shall be one size group larger prior to pruning than the sizes specified in the plans.

Deciduous plants furnished bare-root shall be packed in moisture-retaining material.

Broadleaf evergreen plants and conifers shall be furnished balled and burlapped (B&B) or in suitable containers. Balled and burlapped plants shall be packed with a firm ball of earth surrounded with burlap firmly held in place by a cord or wire wrapping. Balled and burlapped plants shall be handled only by the ball. Broken or loose balls or plants without an adequate root system will not be accepted.

Collected plants shall not be dug until they have been inspected. Collected plants shall be dug with a greater ball or root spread for the applicable plant type as stated in the USA Standard for Nursery Stock. Legible labels shall be attached to each plant which is delivered as a separate unit, and to each box, bundle, bale, or container containing two or more plants.

Packing and shipping of plants shall conform to the applicable requirements set forth in the USA Standard for Nursery Stock.

Required state and federal inspection certificates for plant shipments shall be filed with the Engineer.

The labels shall be left on at least one plant of a group of the same species and on each plant of individual planting during and after planting operations within the same area.

711.07 Commercial Fertilizer. Commercial fertilizer shall be furnished in containers marked with the weight and/or volume with the manufacturer's guaranteed analysis of the contents. Dry fertilizers shall be free from lumps or cakes.

711.08 Soil Conditioner. Soil conditioner may shall consist of compost, peat moss, sedge peat or bark and shall be reasonably free from wood substances and shall have a minimum of 50 percent organic matter by weight. The source shall be approved before shipping to the project.

711.09 Select Topsoil. Select topsoil shall be obtained from approved sources. It shall consist of friable, loamy topsoil reasonably free of refuse, roots and seed of noxious weeds and other material detrimental to vegetative growth.

Vegetation on sources of select topsoil material shall be removed and disposed of prior to taking materials from the source.

Select topsoil furnished by the Contractor from his own source may be tested for any or all of the following properties:

Sieve Size	Percentage by Weight Required to Pass a Square Mesh Sieve
1 in. (25 mm)	98-100
No. 4 (4.75 mm)	95-100
No. 8 (2.36 mm)	80-100
No. 200 (0.075 mm)	15-80
0.005 mm (Hydrometer method)	5-35

Property	Minimum	Maximum
pH*	5.5	7.8
ESP**	-	10.0
EC***	-	8.0
Organic Material	0.5	15.0

* pH - Negative logarithm of the hydrogen ion concentration
** ESP - Exchangeable sodium percentage
*** EC - Electrical conductivity, milliohms per cm at 77°F (25°C).

711.10 Mulch. The sources of all types of mulch shall be approved before shipping to the project.

1. Bark mulch (granular and ornamental type) shall be reasonably free of strips and splinters.

2. Grain straw or grass hay shall be certified noxious weed-free and where it is to be anchored by mechanical crimping shall have approximately 50 percent of the stems exceeding 9 7/8 in. (250 mm) in length.

3. Shredded bark shall have a shredded or stringy texture.

4. Wood and paper fiber shall form a blotter-like ground cover when applied.

711.11 Erosion Blankets. Erosion Blankets shall be of a type described in BMP 3.11 of the Erosion and Sediment Control Manual. Erosion blankets shall be of material and construction that will remain in place and effective for at least one year, as

determined by visual inspection of the Engineer. The type and structure shall be approved. Installation shall be in accordance with the manufacturer's recommendations.

Bonded fiber matrix and hydro-applied blankets shall be applied at a rate recommended by the manufacturer to allow maximum seed germination and vegetative growth and establishment while also addressing erosion.

For bonded fiber matrix, the contractor shall provide certification from the manufacturer that the materials are nontoxic to animals, soil microorganisms, and aquatic or plant life.

For other erosion blankets, including hydro-applied blankets, the contractor shall provide certification from the manufacturer that the materials are nontoxic to animals, soil microorganisms, aquatic and plant life, and will not interfere with or impede seed germination or vegetative growth and establishment.

711.12 Irrigation Water. Irrigation water shall be free of oil, acid, salt, or other substances harmful to plants. The source shall be approved.

711.13 Dust Oil. Dust oil shall meet the following specifications:

DUST OIL

Test	ASTM Method	Minimum	Maximum
Flashpoint 0°F (-18°C) (Open tag.)	D 1310	200 (93)	-
Viscosity 100°F (38°C), Kinematic cst.	D 2170	40	100
Water	D 95	-	0.5
Asphaltenes percent	D 2006*	-	5.0
Saturates	D 2006*	-	20.0
Specific Gravity, 60°F (16°C)	D 1298	1.025	1.200

DISTILLATION:			
Total distillate to 550°F (288°C).	D 402**	-	5
Test on Residue from Distillation to 550°F (288°C).			
Viscosity 100°F (38°C), Kinematic cst	D 2170	50	150
Solubility in Trichlorethylene	D 2042***	98	-

* As modified in procedure identified as "Test Method for Determination of Asphaltene and Saturate Content of Dust Oils" by Materials Testing Laboratory, Region 1, USDA Forest Service, Missoula, Montana, dated November 1970. Copies of the procedure are available from the Regional Materials Engineer, Region 1, USDA Forest Service, Missoula, Montana 59801.

** Except that the residue remaining after a temperature of 550°F (288°C) shall be used for further testing. As modified in procedure identified as "Standard Method of Test for Distillation of Forest Service Dust Oil," dated July 1971. Copies of the procedure are available from the Regional Materials Engineer, Region 1, USDA Forest Service, Missoula, Montana 59801.

*** Trichlorethylene shall be used as a solvent instead of carbon disulfide.

711.14 Epoxy-Resin-Base Bonding Systems For Concrete. Epoxy-Resin-Base Bonding Systems for Concrete shall conform to ASTM C 881. The classification (type and grade) of the system selected shall be as shown on the plans. The class shall be determined by the Supplier and Contractor and approved by the Engineer after project conditions have been established. Materials and application shall conform to the applicable ACI Standards: 503.1, 503.2, 503.3 or 503.4. The Contractor shall submit the manufacturer's certification verifying conformance to material specifications.

711.15 Recycled Glass. Recycled glass, whole bottles or crushed glass, for use in roadway fills, and crushed glass for use in granular borrow or aggregate base shall be free from contamination by foreign material. Small amounts of caps and labels normally associated with recycled glass is acceptable. The contractor shall certify in writing that the glass is from a waste stream generated in Idaho.

711.16 Mulch Tackifier. Mulch tackifiers shall be a material that bonds mulch together in such a manner that it will prohibit the mulch from washing or blowing away after application. When cured, the tackifier shall not be re-emulsifiable. Tackifier shall be mixable in water, non-toxic to animals, soil microorganisms, aquatic and plant life; and not interfere with or impede seed germination, vegetative growth and establishment and nonstaining to concrete or painted surfaces.

711.17 Mulch plus Tackifier. Mulch plus tackifier shall consist of premixed packaged wood fiber mulch with tackifier or wood fiber mulch plus tackifier added prior to application and shall be mixed in accordance with manufacturer's written instruction. Mulch plus tackifier shall conform to 711.10 Mulch and 711.16 Mulch Tackifier.

711.18 Soil Amendments. Soil amendments shall consist of organic soil applied compost or manufactured organic soil amendments. Compost shall be a Class A compost that meets or exceeds US EPA 40 CFR #503 Regulation, Standard Specifications for Classification Type I and pass a Solvita Maturity Test of 5 or greater. Manufactured organic soil amendments and/or soil biological stimulants shall consist of organic materials, nutrients, and minerals that show the propensity and performance to facilitate and sustain the germination and growth of vegetation.

711.19 Mulch Mixture. Mulch mixture shall consist of mulch, soil amendments, soil biological stimulants, soil microorganism inoculants, bonding fibers, tackifiers, and other erosion control and plant nutrient ingredients as specified in the special provisions. Mulch mixture shall be premixed using the specified products and rate, and shall be hydro-applied in one operation.

SECTION 712 - SIGNING MATERIALS

712.01 Plywood for Type E Signs. The plywood shall conform to U.S. Product Standard for Construction and Industrial Plywood, exterior type grade, B-B high density overlay, 2 sides. The standard color shall be natural. Edges of the plywood shall be sealed.

712.02 Reflective Sheeting.

1. *Materials.* Retroreflectivity sheeting material shall conform to ASTM D 4956, except the minimum coefficients of retroreflection for brown type I sheeting shown in ASTM D 4956, Table 1 are amended as follows: 2.0 cd/fc/ft^2 (2.0

cd/lx/m^2) at 0.2° observation angle and -4° entrance angle, 1.0 cd/fc/ft^2 (1.0 cd/lx/m^2) at 0.2° observation angle and +30° entrance angle and at 0.5° observation angle and -4° entrance angle, and 0.5 cd/fc/ft^2 (0.5 cd/lx/m^2) at 0.5° observation angle and +30° entrance angle.

Retroreflective sheeting material shall conform to ASTM D 4956 supplemental requirement S1 if specified. Reboundable retroreflective sheeting shall conform to ASTM D 4956 including supplemental requirement S2.

2. *Reflectivity Requirements.*

   a. Class A. All reflective sheeting used for direct applied legends, borders and sign backgrounds shall meet the retroreflective requirements of ASTM D 4956, Type I sheeting.

   b. Class B. All reflective sheeting used for reflector units, removable cutout legends, borders, orange colored signs, barricades, drums, vertical panels, and all STOP, YIELD, DO NOT ENTER, and WRONG WAY signs shall meet the retroreflectivity requirements of ASTM D 4956, Type III sheeting.

3. *Fabrication.* The reflective sheeting shall be applied on aluminum or plywood sections as required in accordance with the manufacturer's recommendations and in such a manner that no background material will be visible when the sign is assembled.

   Splicing of reflectorized sheeting will not be permitted on panels 24 in. (600 mm) or less in width. On larger panels only one splice will be accepted per sign. Splices shall be horizontal or at 45 degrees from horizontal with the top sheet overlapping the bottom sheet not less than 3/16 in. (5 mm) except for signs screen processed with transparent color which shall have butt splices. Butt splices shall not have a gap of more than 1/32 in. (1 mm) between the sheets or reflective material. Manufactured splices in the reflective sheeting will be accepted in addition to the above limitations.

Sign faces composed of two or more pieces of panels or reflective sheeting shall be carefully matched for color at the time of sign fabrication. Non-uniform shading and undesirable contrast between adjacent widths of applied sheeting will not be accepted.

Cracks, discoloration, appearance of air pockets, or any other indication of non-adherence in the sheeting will not be accepted.

Finish. Sign edges and all splices of the reflective sheeting shall be sealed in conformance with the methods specified by the reflective sheeting manufacturer.

Direct applied cutout reflective sheeting legends, borders and symbols shall be cut with a smooth regular outline, free from ragged or torn edges. Letters, numerals and symbols having interior or exterior rounded corners shall be cut with a smooth 3/16 in. ± 1/16 in. (5 mm ± 2 mm) radius.

712.03 Reflectorized Removable Cutouts. General Description. Reflectorized cutouts shall consist of reflective sheeting applied to aluminum backing.

Reflective Sheeting Letters.

1. The reflective sheeting shall be in conformance with Subsection 712.02-2.

2. The reflective sheeting shall be applied to 0.032 in. (0.8 mm) minimum thickness aluminum sheet conforming to ASTM B 209, Alloy 3003-H14.

3. Each letter, numeral, symbol and border shall be provided with mounting holes to secure it to the sign face.

712.04 Reflector Units for Delineators.

Reflectors for Rigid Post Delineators. Reflective sheeting for reflectors shall meet the requirements of Subsection 712.02. The reflective sheeting shall be applied to aluminum sheet 0.063 in. (1.6 mm) thickness conforming to ASTM B 209, Alloy 6061-T6, with an alodine 1200 finish. The aluminum sheet shall be the same size as the reflective sheeting and shall be provided with suitable mounting holes.

Reflectors for Flexible Post Delineators. Reflectors shall be direct applied reflective sheeting, Type III, that meets the requirements of Subsection 712.02.

Barrier Mounted Reflectors - Type 9. Reflectors shall be reflective sheeting, Type III that meets the requirements of Subsection 712.02. Reflectors shall be mounted to flexible or rigid substrate materials as per manufacturer's specifications.

712.05 Porcelain Enamel. Porcelain enamel shall be applied in accordance with the recommendations of the manufacturer of the porcelain enamel materials. The sign face and the outside surfaces of the 2 in. (50 mm) extruded channel legs shall have porcelain enamel. The thickness of the porcelain enamel shall not be less than 0.0025 in. (0.064 mm) nor more than 0.005 in. (0.13 mm).

Tooling marks on the back legs of the extrusions shall not be cause for rejection.

Defects in the coating shall be cause for rejection.

The color of the porcelain enamel on aluminum as specified on the plans shall be visually matched with and within the limits of the current Color Tolerance Charts, prepared by the U.S. Department of Transportation, Federal Highway Administration, except Black which shall conform to the Federal Standard No. 595a, Color No. 27038 Black.

The porcelain enamel shall have a gloss reading of 35-65 units at an angle of 45° when measured on a gloss meter.

Porcelain enamel shall be tested in conformance with the following specifications:

Acid Resistance of Porcelain Enamel (Citric Acid Spot Test) .....ASTM C 282
Resistance of Porcelain Enameled Utensils to Boiling Acid.....ASTM C 283
Spalling Resistance of Porcelain Enameled Aluminum .....ASTM C 703
Measurement of Dry Film Thickness of Non-Metallic
Coatings of Paint, Varnish, Lacquer, and Related Products
Applied on a Non-Magnetic Base, Method B .....ASTM D 1400

712.06 Polyester Powder Coating. Aluminum sign panels shall be surfaced with electrostatically applied polyester powder color coating.

Workmanship. All materials shall be new. Defects in the finish color coating shall be cause for rejection. Tooling marks on the back legs of the extrusions shall not be cause for rejection. The color coating shall be applied according to the recommendation of the coating manufacturer.

Aluminum Pretreatment. The front and back surfaces of the aluminum panels shall be cleaned and coated with an Alodine 1200 finish or approved equal pretreatment.

Polyester Powder Color Coating.

a. Thermosetting polyester powder coatings shall be manufactured by H.B. Fuller Company or approved equal. The applicator must be specifically approved by the coating manufacturer. Extruded aluminum panels shall be surfaced with polyester powder color coating electrostatically applied to only the panel face and the 2 in. (50 mm) legs. Overspray of the coating is permissive on the back side of the panel.

b. *Thickness.* The thickness of the surface material fused to the extruded aluminum panels shall be uniform and shall be 0.003 in. (0.076 mm) minimum.

c. *Colors.* The color of the polyester powder coatings on aluminum as specified shall be visually matched with and within the limits of the current Color Tolerance Charts, prepared by the U.S. Department of Transportation, Federal Highway Administration, except Black which shall conform to the Federal Standard No. 595a, Color No. 27038 Black.

d. *Gloss.* The surface of the polyester powder coating, after application of the extruded aluminum panels, shall exhibit a 60° specular gloss of 70 maximum when tested in accordance with ASTM designation D 523.

e. *Chemical Resistance.* Surface coating applied to the aluminum substrate shall exhibit no loss of adherence, gloss, color change or staining when tested in accordance with the following procedure:

   Prepare four 2 x 4 in. (50 x 100 mm) specimens and totally immerse one each for 24 hours in the following:

   1. Mineral spirits.

   2. Detergent solution; 0.5 percent by volume Tide or equivalent.

   3. Trisodium phosphate; 2 percent by volume.

   4. Soap solution; 2 percent by volume Ivory or equivalent.

   Remove, rinse specimens in clear water, and allow 24 hours recovery prior to visual evaluation.

f. *Salt Spray Resistance.* A 4 x 8 in. (100 x 200 mm) specimen of surface coated aluminum shall be exposed 1000 hours in accordance with ASTM B 117. The

edges of all specimens shall be shear trimmed and shall be scored diagonally deep enough to expose base metal. Undercutting of any coating from scored lines or sheared edges shall not exceed 1/8 in. (3 mm). In addition, the test specimen shall not exhibit loss of gloss, color change or staining when tested as above.

712.07 Silk Screen Paint. Silk screen paints and paint materials shall be applied in accordance with the manufacturer's recommendations; shall be waterproof for outdoor use; and shall dry within 18 hours to a film without running, streaking, or sagging.

Colored silk screen paints shall be visually matched with and within the limits of the current Color Tolerance Charts, prepared by the U.S. Department of Transportation, Federal Highway Administration.

712.08 Silk Screen Paste. Transparent silk screen paste shall produce the desired color when applied on reflective sheeting background and shall meet the requirements of Subsection 712.02.

712.09 Plastic Lettering Film. The material shall consist of a flexible, glossy black, plastic film with a tack free adhesive coating on the back side and a paper liner attached to the face side of the film. The film shall be solvent resistant. The pre-coated adhesive shall be either pressure sensitive or activated by the application of heat or solvent.

Applied as directed by the manufacturer, the film shall form a durable bond with the reflectorized sign background sheeting enabling it to withstand severe weather conditions without appreciable loss of bond.

712.10 Flexible Post Delineators. Flexible post delineators shall be as specified in the plans. The posts may be of any design, provided they are driveable, flexible, non-warping, non-metallic, durable composite material. Posts shall be resistant to damage due to impact, ultraviolet light, ozone, hydrocarbons and other effects of atmospheric weathering. Posts shall resist overturning, twisting, displacement from wind and impact forces and stiffening with age. Posts shall be designed for a minimum life equaling 60 months of outdoor service and include a strip of reflective sheeting 3 inches (75 mm) wide by 6 inches (150 mm) long which conforms to 712.04, and is direct applied to the post with high tack adhesive.

A flexible post, or a flexible post with a steel stub or sleeve, shall be considered

driveable if it can be driven into the soil using installation methods and equipment as recommended by the post manufacturer.

Reflective sheeting shall be either white or yellow as required. Posts shall be white or as specified on the plans. The top of the reflective sheeting shall be mounted no less than 2 inches (50 mm) nor more than 2 1/2 inches (65 mm) from the top of the post and centered on the post across its width.

712.11 Flexible Snow Poles. Flexible post delineators shall be 3/8 inches by 1 ¼ inches (10 mm by 32 mm) by the length specified in the plans. Snow poles must be constructed of a non-warping, non-metallic, durable composite material designed for permanent installations that resist impacts as a result of snow plowing or twisting. Poles shall be resistant to displacement from wind, ultraviolet light, ozone, hydrocarbons and other effects of atmospheric weathering. Poles shall resist stiffening with age and be designed for a minimum life equaling 60 months of outdoor service.

Flexible snow poles shall be as required by the Special Provisions or from the Qualified Products List.

The material composition of the flexible snow poles furnished shall not vary from that of the samples upon which the product was qualified.

Reflectors shall meet the requirements of Subsection 712.04.

Unless otherwise specified, the color of the snow pole shall be orange. The color of the reflector shall be white or yellow as specified in the plans or approved by the Engineer.

SECTION 713 - ILLUMINATION MATERIALS

713.01 High Pressure Sodium Vapor Luminaires. Each street lighting luminaire except underpass luminaires shall have a 2 in. (50 mm) slipfitted type of mounting and shall be designed for the horizontal operation of the sodium vapor lamp specified. All street lighting luminaire refractors shall provide the IES type light distribution specified on the plans by means of refraction, reflection, adjustable sockets or any combination thereof.

Sign lighting luminaires shall be High Pressure Sodium type and shall be approved for use prior to installation.

All luminaires shall be individually ballasted, unless remote ballasts are specifically permitted by the plans.

713.02 High Pressure Sodium Pressure Ballasts. The type of ballast shall be as specified on the plans. The ballast shall be pre-wired to the lamp socket and terminal board. The minimum efficiency of the ballast shall be approximately 86 percent. The ballast shall be rated for operation to -20°F (-29°C).

Connections to the ballasts shall be readily made by either splicing to existing leads or by screw type terminal blocks. All leads or terminals shall be easily identified.

713.03 Rigid Steel Conduit. Conduit shall be protected against corrosion by galvanizing or sherardizing.

713.04 Rigid Plastic Conduit. Conduit shall conform to ASTM D 1784, NEMA TC-2 (EPC-40) and U.L. Std. 651.

713.05 Concrete Junction Boxes. Concrete junction boxes shall be constructed of vibrated concrete and be bottomless. The lid shall be steel diamond plate 3/16 in. (5 mm) minimum thickness, with a locking device to hold the lid securely in place and painted with a corrosion preventive type paint, gray in color. A 3/8 in. x 1 in. (10 mm x 25 mm) plated bolt shall be welded to the bottom of the steel lid. A 36 in. (900mm) section of #10 AWG Green THWN wire with ring connector shall be placed on the bolt and attached with a 3/8 in. (10 mm) nut.

Size “A” shall have inside dimensions of 9 x 5 x 10 in. (230 x 130 x 250 mm) depth and a nominal wall thickness of 2.5 in. (60 mm).

Size “B” shall have inside dimensions 13 x 9 x 10 in. (330 x 230 x 250 mm) depth and a nominal wall thickness of 50 mm (2 in.).

Size “C” shall have inside dimensions of 18 x 13 x 15 in. (460 x 330 x 380 mm) depth and a nominal wall thickness of 2 in. (50 mm).

“A”, “B” and “C” junction boxes shall have metal tops and shall be reinforced with welded wire continuously within the walls.

Size “D” shall have inside dimensions of 36 x 32 x 28 in. (900 x 810 x 710 mm) depth with a nominal wall thickness of 3 in. (75 mm) and shall be reinforced by a 10 mm

round rebar hoop 2 in. (50 mm) below the top of the box and No. 10 (3.5 mm) welded wire mesh continuously within the walls.

Detailed shop drawings shall be submitted for approval.

713.06 Composite Junction Boxes. Composite junction boxes shall be composed of polymer concrete and reinforced by a heavy weave fiberglass and shall be constructed bottomless. The cover shall be a heavy duty traffic cover rated for no less than 80 psi (550 kPa). Covers shall be furnished with a positive locking device to hold them securely in place. Size "PGB" shall have nominal inside dimensions of 10 x 19 x 12 in. (250 x 480 x 300 mm) deep and wall thickness of 1/2 in. (12 mm). Size "PGC" shall have nominal inside dimensions of 13 x 27 x 18 in. (330 x 660 x 460 mm) deep and wall thickness of 1/2 in. (12 mm). Junction boxes and covers shall be concrete gray in color.

713.07 Electrical Conductors. All electrical conductors shall be U.L. labeled and listed AWG, or equivalent, stranded copper.

SECTION 714 - FLY ASH

714.01 General Requirements. Natural pozzolans and fly ash shall conform to AASHTO M 295 except that loss on ignition (LOI) shall not exceed 1.5 percent for all classes. When the contract or source approval requires fly ash concrete, Class F fly ash shall be used, and available alkalies in the fly ash (as Na2O) shall not exceed 2.0 percent. In addition, Calcium Oxide (CaO) content shall not exceed 9 percent. The Contractor shall submit the manufacturer's certification of material class and conformance to material specifications.

Fly ash materials shall be protected from exposure to moisture until used. Containers used for transport or storage of fly ash shall be tightly sealed and adequately separated from other material containers to prevent seepage or mixing of materials. Equipment used for discharge of fly ash shall have positive shut-off controls at the point of discharge.

Fly ash used as a partial substitute for Portland cement may cause a delay in strength gain and may require more curing time before the concrete is exposed to loadings.

714.02 Acceptance Requirements. Fly ash materials may be accepted for use on the basis of the manufacturer's certification as provided in Subsections 106.04 and 106.05.

SECTION 715 - GABION AND REVET MATTRESS

715.01 Mesh. Gabion panels for the base, ends, sides, diaphragms, and lids may be fabricated from either welded or twisted wire mesh. Only one type of wire mesh may be used in any one structure. Individual wires of either type wire mesh shall meet the following requirements:

Characteristic	Test Designation	Requirements
Minimum Tensile Strength	ASTM A 370	60,000 psi (414 Mpa)
Wire Size Wire Diameter Minimum Galvanizing	USA Steel Wire Gage ASTM A 641, and ASTM A 90	11 0.120 in. (3.05 mm) 0.116 in. (2.95 mm) 0.80 oz/sf (240 g/m^2)
Wire Size Wire Diameter Minimum Galvanizing	 ASTM A 641, and ASTM A 90	9 0.148 in. (3.76 mm) 0.144 in. (3.66 mm) 0.90 oz/sf (270 g/m^2)

Welded wire mesh shall also conform to ASTM A 185 except that the weld shears shall be 600 pounds force (2.67 kN) for 11-gage and 800 pounds force (3.56 kN) for 9-gage wires. All wire gages are United States Steel Wire Gage after galvanizing.

Gabion panels of the welded wire mesh shall be manufactured from 11-gage or 9-gage. The mesh shall form a nominal 3 in. by 3 in. (75 mm by 75 mm) square grid pattern and shall be made by resistance welding in accordance with ASTM A 185. The maximum diagonal dimension of any grid opening shall not exceed 4.75 in. (120 mm).

Gabion panels of twisted wire mesh shall be manufactured from 11-gage wire with 9-gage selvedge wires. The mesh shall form a uniform hexagonal pattern and shall be formed with a nonraveling twist. The major axis (maximum line dimension) of any hexagonal opening shall not exceed 4.75 in. (120 mm).

715.02 Fabrication. Gabions shall be fabricated in such a manner that the sides, ends, lids, and diaphragms can be assembled at the construction site into a rectangular basket of required sizes. Gabion shall be of a single unit construction. The base, ends, and sides shall either be woven into a single unit or one edge of these members connected to the base section of the gabion in such a manner that strength and flexibility at the point of connection is at least equal to that of the mesh.

Where the length of the gabion exceeds its horizontal width, the gabion shall be equally divided by diaphragms, of the same mesh and gage as the body of the gabion, into cells whose length does not exceed the horizontal width. The gabion shall be furnished with the necessary diaphragms secured in proper position on the base section in such a manner that no additional tying at this juncture will be necessary.

All perimeter edges shall be securely selvedged or bound so that the joints formed by tying the selvedges shall have the same strength as the body of the mesh.

715.03 Packing and Marking. Gabions shall be shipped folded flat in bundles not to exceed 1200 lbs (545 kg) in weight. Each bundle shall contain gabions of one size except that odd numbers necessary to complete an order may be made into a bundle of less than the uniform number. This bundle shall be clearly marked to identify it from all others. Each gabion shall be clearly marked by color code, or some other readily identifiable means to indicate size. Bundles shall not be handled by lifting on gabion mesh to avoid damage to wire or galvanizing.

715.04 Dimensions. Gabions shall be supplied in various lengths and heights as shown on the plans. All gabion dimensions are subject to a tolerance limit of ± 5% of manufacturer's stated sizes.

715.05 Joints. Wires used to form joints shall conform to the definitions and requirements of ASTM A 641 for "carbon steel", zinc-coated wire and shall meet the following requirements:

Characteristic	Test Designation	Requirements
Minimum Tensile Strength	ASTM A 370	60,000 psi (414 Mpa)
Wire Size Wire Diameter Minimum Galvanizing	USA Steel Wire Gage ASTM A 641, and ASTM A 90	13.5 0.086 in. (2.18 mm) 0.083 in. (2.11 mm) 0.72 oz/sf (220 g/m2)
Wire Size Wire Diameter Minimum Galvanizing	 ASTM A 641, and ASTM A 90	9 0.148 in. (3.76 mm) 0.144 in. (3.66 mm) 0.90 oz/sf (270 g/m2)

Spiral binders shall have a 3 in. (75 mm) separation between continuous, successive loops.

Internal connecting wires or preformed stiffeners shall be at least 13.5-gage. Each wire shall also meet the minimum requirements of the wire in this specification.

The contractor can request acceptance of alternative fasteners. Alternative fasteners shall be fabricated such that when the ends are brought together and properly closed, the fastener forms a closed loop with an overlap of at least 1 in. (25 mm). The closed loop shall have an inside area that is large enough to enclose up to 4 selvedged wires.

Fasteners shall conform to ASTM A 764, and shall have the same weight of coating as specified in ASTM A 641. Stainless steel shall conform to ASTM A 313 for applications involving PVC coated gabion baskets. The fastener shall resist a direct tension force across any axis, of at least 600 pounds force (2.67 kN) while remaining closed. Random samples of fasteners shall be submitted for testing at least 10 working days prior to construction of gabions. The contractor shall submit 12 formed and 12 unformed fasteners. Formation of the 12 formed fasteners shall be done at the job site by the contractor and shall be witnessed by the Engineer. Fasteners shall be spaced at intervals of 4 in. to 6 in. (100 mm to 150 mm) with at least one fastener per gabion mesh opening.

715.06 Gabion Fill Material. The fill material for the wire gabions shall be rock ranging in size from a minimum of 4 in. (100 mm) to a maximum of 8 in. (200 mm), both measured in the greatest dimension. Rock shall be sound, durable, well graded, and shall not disintegrate on exposure to water or weathering during the life of the structure. Rock for gabions shall be obtained from a source approved by the Engineer. The minimum unit weight of a rock-filled gabion shall be 110 lbs/cu. ft. (1760 kg/m^3). Verification of the gabion unit weight shall be done when ordered by the Engineer.

715.07 Geotextile. Geotextile, if used, shall be in accordance with the requirements of Subsection 718 - Riprap/Erosion Control Geotextile.

715.08 Testing. When ordered by the Engineer, gabions which have not been previously tested and approved, shall be tested as follows:

Cubical-Celled Gabions – Wire mesh of gabions with a 3-ft by 3-ft (0.9 m by 0.9 m) square cross section shall have sufficient strength and flexibility when assembled and filled with rock to pass the following test:

Loading and Configuration: Place an approximate 4000-pound (1800 kg) line load over the center of a 12-ft (3.6 m) long gabion (perpendicular to the long axis), which is unsupported under the middle 6 ft. (1.8 m) and anchored at both ends. (A piece of concrete pipe 4 ft (1.2 m) diameter or less, weight about 4000 pounds (1800 kg), can be used to impose the required line load on the gabion).

Requirements: Deflection at the unsupported mid span shall be no greater than 0.50 ft (150 mm). There shall be no visible reduction of wire size in any panel, no loss of internal rock, and no unraveling of twisted-mesh or weld breaks in welded-mesh.

Mattress-Style Gabions – Wire mesh of gabion mattresses, 1 ft. or 1.5. ft. (300 mm or 450 mm) high, shall have sufficient strength and flexibility when assembled and filled with rock to pass the following test:

Loading and configuration: The base of a 3 ft. wide by 12 ft. long (0.9 m by 3.6 m) gabion shall initially be supported 2.5 ft. (0.75 m) above the ground. No load will be placed on the mattress. Remove about 3 ft. (0.9 m) long of support from the end of the mattress.

Requirements: The cantilevered, unsupported end shall sag and touch the ground. There shall be no visible reduction of the wire size in any panel, no loss of internal rock, and unraveling of twisted-mesh or weld breaks in welded-mesh.

Those systems which have been previously tested and approved by the Engineer shall be accepted for use upon the approval of the Engineer.

SECTION 718 – GEOTEXTILES

718.01 General Requirements. The geotextile shall be composed only of long chain polymeric filaments or yarns oriented into a stable network, which retains its relative structure, including selvedges, during handling, placement, and design service life. At least 85% by weight of the long chain polymers shall be polyolephins,

polyesters, or polyamides. The geotextile shall be free from defects or tears. Geotextiles may be rejected by the Engineer if dimensional stability or resistance to ambient temperatures, acid or alkaline conditions, and micro-organisms/insects do not appear to be satisfactory for the intended purpose. The geotextile shall conform to the properties as indicated in Subsections 718.05 through 718.09 as appropriate for each specified use. The geotextile shall be free of any treatment or coating which might adversely alter its physical properties after installation.

718.02 Certification. The Geotextile will be accepted by certification. The Contractor shall furnish the geotextile manufacturer's certified test results attesting that the geotextile and all factory seams meet the requirements stated in these specifications for the intended application. The certification shall state that the named product conforms to the requirements listed in applicable Subsections 718.05 through 718.09, or as modified in the Special Provisions and that representative samples thereof have been sampled and tested as specified.

The certification shall include the following information about each geotextile to be used:

Manufacturer's name and current address,
Full product name,
Geotextile roll number,
Proposed geotextile use(s), and
Certified test results.

The certification shall give the name and address of the testing agency and the date of tests; and shall set forth the means of identification, including lot number, which will permit field determination of the product delivered to the project as being the product covered by the certification.

The certified copy of the test results shall include each test result, each mean roll value, the calculated standard deviation for each lot, and the manufacturer's coefficient of variation for all test results.

The certification shall be in duplicate with one copy to be sent with the shipment of the covered product to the Engineer, and with one copy sent to the Central Materials Laboratory.

718.03 Samples. The Engineer will be present at the site during installation, and the Engineer reserves the right to collect samples periodically for confirmation testing.

The geotextile samples shall be cut from the roll with scissors, sharp knife, or by another suitable method that produces a smooth edge and does not cause ripping or tearing. The sample shall not be taken from the outer wrap of the geotextile roll nor taken from the inner wrap of the core. Each sample shall have a minimum dimension of 6 ft (2.0 m) by the full roll width. One sample per lot shall be submitted.

The samples shall be labeled with the lot and batch number, date of sampling, project number, specifications, manufacturer, and product name. A lot shall be defined as all geotextile rolls within the same consignment or shipment, which were produced by the same manufacturer and have the same product name or designation.

Prior to installation, samples of sewn seams shall be submitted to the Central Materials Laboratory. The seam sewn for sampling shall be sewn using the same equipment and procedures as will be used to sew the production seams. If production seams will be sewn in both the machine and cross-machine directions, the Contractor must provide sewn seams for sampling which are oriented in both the machine and cross-machine directions. The seams sewn for sampling must be at least 6 ft. (2 m) in length in each direction. If the seams are sewn in the factory, the Engineer will obtain samples of the factory seam at random from any of the rolls to be used.

718.04 Testing. The Department reserves the right to perform tests as necessary as to determine that geotextile properties conform to the values specified herein for the intended application(s).

All geotextile property requirements stated herein are minimum average roll values. The tensile strengths shall be determined in both machine and cross-machine directions.

718.05 Drainage Geotextile Property Requirements. Nonwoven or monofilament woven geotextiles are acceptable. Slit film or slit tape geotextiles will not be permitted for drainage applications:

Geotextile Property	Test Method	Minimum Roll	Average Values
		Type I (1)	Type II
Grab Tensile Strength – lb. (N) (In either principal direction)	ASTM D 4632	80 (365)	180 (800)
Grab Elongation (%)	ASTM D 4632	NA	
Puncture Strength – lb. (N)	ASTM D 4833	35 (155)	80 (355)
Apparent Opening Size (AOS) (Std. Sieve)	ASMT D 4751	0.212 mm (#70)	Or Finer
Permittivity (sec-1)	ASMT D 4491	0.7	0.7

(1) Type I refers to protected conditions. Type II refers to unprotected conditions. Protected conditions include: trench depth ≤ 10 ft (3 m), rounded aggregate or crushed aggregate less than 4 in. (100 mm) size, and relatively smooth trench walls. All other conditions are unprotected.

Note: Strength properties of drainage geotextiles placed on level or near level surfaces such as under drain blankets or on subgrade shall meet those specified in Subsection 718.07.

718.06 Riprap/Erosion Control Geotextile Property Requirements. Nonwoven or monofilament woven geotextiles are acceptable. Slit film or slit tape geotextiles will not be permitted for riprap/erosion control applications, including installation behind gabions.

Geotextile Property	Test Method	Minimum Roll	Average Values
		Type I (1)	Type II
Grab Tensile Strength – lb. (N) (In either principal direction)	ASTM D 4632	130 (580)	200 (890)
Grab Elongation (%)	ASTM D 4632	15	15
Puncture Strength – lb. (N)	ASTM D 4833	60 (270)	80 (355)
Trapezoidal Tear – lb. (N)	ASTM D 4533	40 (180)	50 (225)
Apparent Opening Size (AOS) (Standard Sieve)	ASTM D 4751	#50 (0.3 mm) or	Finer
Permittivity (sec-1)	ASTM D 4491	0.5	0.5
Ultraviolet (UV) Radiation Stability	ASTM D 4355	70% Strength @150 hrs.	Retained

(1) Low to moderate survivability geotextiles (Type I) may be used behind gabions less than 10 ft. (3 m) high without an aggregate cushion. In severe conditions, where stones will be larger than 240 lb (110 kg), or drop heights cannot be practically reduced, a higher survivability fabric (Type II) will be necessary.

718.07 Subgrade Separation Geotextile Property Requirements. Nonwoven or woven geotextiles are acceptable.

Geotextile Property	Test Method	Minimum Roll	Average Values
		Type I	Type II (1)
Grab Tensile Strength – lb (N) (In either principal direction) (2)	ASTM D 4632	180/115 (800/510)	270/ (1801200/800)
Grab Elongation (%) (2)	ASTM D 4632	<50%/≥50%	<50%/≥50%
Puncture Strength – lb (N) (2)	ASTM D 4833	70/40 (310/180)	100/75 (445/335)
Trapezoidal Tear Strength – lb (N)	ASTM D 4533	70/40 (310/180)	100/75 (445/335)
Apparent Opening Size (AOS) (3) (Standard Sieve)	ASTM D 4751 COE CW-002215	#30 (0.60 mm)	Or Finer
Permittivity (sec-1) (3)	ASTM D 4491	0.02	0.02

(1) Type I refers to moderate survivability conditions; Type II to high survivability conditions. Moderate survivability is low to moderate ground pressure equipment, ≤ 40 psi (275 kPa), with 12 in. to 18 in. (300 mm to 450 mm) initial lift thickness or high ground pressure equipment, > 40 psi (275 kPa), with more than 18 in. (450 mm) initial lift thickness. High survivability is low to moderate ground pressure equipment with 6 in. to 12 in (150 mm to 300 mm) initial lift thickness or high ground pressure equipment with 12 in. to 18 in. (300 mm to 450 mm) initial lift thickness. Subgrade condition is assumed cleared of rocks, stumps & large limbs, and graded reasonably smooth. If subgrade preparations or clearing is not in accordance with the above, or cover material is angular shot rock, even higher survivability geotextiles may be necessary.

(2) The dual values for strengths for each geotextile Type are related to the grab elongation. For geotextiles with elongation which is less than 50%, the first strength values are applied. For geotextiles with elongation which is equal or greater than 50%, the second strength values are applied.For geotextiles with less than 50% elongation, higher strengths are required.

(3) Minimum values: specify as appropriate for site conditions. Where subgrade geotextiles will function in a drainage application, Permittivity and AOS values shall be in accordance with Subsection 718.05.

718.08 Pavement Overlay Geotextile Property Requirements. Only nonwoven geotextiles are acceptable.

Geotextile Property	Test Method	Minimum Average Role Values
Grab Tensile Strength – lb (N) (In each principal direction)	ASTM D 4632	80 (355)
Grab Tensile Elongation (%)	ASTM D 4632	50
Trapezoidal Tear Strength – lb (N)	ASTM D 4533	40 (175)
Asphalt Retention – gal/yd^2 (L/m^2)		0.20 (0.90)

718.09 Temporary Silt Fence Geotextile Property Requirements. Geotextiles meeting the following are acceptable:

Geotextile Property	Test Method	Minimum Average Role Values
Grab Tensile Strength – lb (N) (In either principal direction)	ASTM D 4632	90 (400)
Grab Elongation (%) At 50% of minimum Tensile Strength 45 lb (200 N)	ASTM D 4632	50 max (1)
Permittivity (sec –1)	ASTM D 4491	0.05
Apparent Opening Size	ASTM D 4751 COE CW-002215	#20 (0.85 mm) or finer
Ultraviolet (UV) Radiation Stability Retained	ASTM D 4355	70% Strength Retained @ 150 hrs

(1) For wire fence supported fabric, elongation requirements are not applicable.

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SUPPLEMENTAL SPECIFICATIONS

ON PAGE 3, SUBSECTION 101.01- ABBREVIATIONS

Incorporate the following in alphabetic order:

ACPA American Concrete Pipe Association
NPCA National Precast Concrete Association

ON PAGE 4, SUBSECTION 101.02- DEFINITIONS

Delete the last paragraph and substitute the following:

Contract items are numbered to correspond to sections of these specifications. Special provision contract items are numbered beginning with an "S" followed by either a section number to which work is similar, or to a 900 generic series number.

ON PAGE 18, SUBSECTION 104.03- CHANGES AND EXTRA WORK

In the first sentence of Part 4 delete "720" and replace with "seven (7) calendar".

ON PAGE 19, SUBSECTION 104.03- CHANGES AND EXTRA WORK

Delete the first sentence of Part 10 and Substitute the following:

> It is considered that overhead and profit for the subcontractor are included in the agreed price, and no additional markups, above that provided for the prime Contractor's administrative expenses, will be allowed.

ON PAGE 23, SUBSECTION 104.06- MAINTENANCE OF PUBLIC HAUL ROADS

Delete from the first full sentence, "205.17"

ON PAGE 25, SUBSECTION 105.01- AUTHORITY OF THE ENGINEER AND SUSPENSION OF WORK

Delete Parts 3, 4, & 5 and substitute the following:

3. Upon receipt, the Engineer will evaluate the Contractor's request. If the Engineer agrees that the cost and/or time required for the performance of the contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the Engineer will make an adjustment and modify the contract in writing accordingly. The Engineer will notify the Contractor of the determination whether or not an adjustment of the contract is warranted.

4. In making the contract adjustment a markup for profit will only be allowed on changed or extra work caused by the delay or suspension. No profit will be allowed on any other delay or suspension costs including, but not limited to, standby costs or extended indirect costs. Payment for changed and extra work will be made in accordance with Subsection 104.03.

5. No contract adjustment will be allowed unless the Contractor has submitted the request for adjustment within the time prescribed.

6. No contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided for or excluded under any other term or condition of this contract.

7. In case of suspension of work the Contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project; provide for normal drainage; protect erodible surfaces by approved erosion and sediment control measures; prevent water pollution and prevent damage by sedimentary deposits; and erect any necessary temporary structures, signs, or other facilities. During such period of suspension of work, the Contractor shall also properly and continuously maintain, in an acceptable growing condition, all living material in newly established plantings, seedings, and soddings furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

ON PAGE 27, SUBSECTION 105.04- COORDINATION OF PLANS, SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS, AND SPECIAL PROVISIONS.

Add the following to the first partial paragraph.

The details shown in the bid schedule shall govern when in conflict with other project documents.

ON PAGE 34, SUBSECTION 105.17- CLAIMS FOR ADJUSTMENTS AND DISPUTES

Delete from the first sentence of the third full paragraph "6030" and substitute "60".

ON PAGE 64, SUBSECTION 105.20- VALUE ENGINEERING CHANGE PROPOSALS (VECP)

Delete (5) and substitute the following:

(5) If the VECP requires the services of a Professional Engineer as required by Idaho Code, the VECP shall be stamped by a Professional Engineer licensed in the State of Idaho.

ON PAGE 66, SUBSECTION 106.03- SAMPLES, TESTS, CITED SPECIFICATIONS

Add after the first paragraph:

Testing performed on the Contractor's behalf for plant mix designs, alkali-silica reactivity expansion and dispute resolution shall be performed under the direct supervision of a Professional Engineer licensed in the state of Idaho. Test reports shall be stamped by the supervising Professional Engineer licensed in the state of Idaho.

Add after the third paragraph:

Revised WAQTC, AASHTO and Idaho test methods become effective when the test method is published in the Quality Assurance Manual. Revised AASHTO test methods not included in WAQTC become effective November 1 of the year published by AASHTO.

ON PAGE 71, SUBSECTION 106.09- MATERIAL SOURCES

Add the following:

The Contractor shall be responsible for construction and maintenance of haul roads from materials sources to the site of the work or to the nearest public road. Maintenance shall include dust abatement.

Discharge of turbid waters which would create pollution shall not be allowed into any streams or other bodies of water.

ON PAGE 71, SUBSECTION 106.10- PREPARATION OF MATERIAL SOURCE

Delete the heading of this subsection and substitute the following

106.10 Preparation of Department Controlled Material Source.

ON PAGE 71, SUBSECTION 106.11- PRODUCTION OF MATERIAL

Delete from the second sentence of the first paragraph "designated sources," and substitute "department controlled sources,"

ON PAGE 81, SUBSECTION 107.11- CONTRACTOR'S RESPONSIBILITY FOR WORK

Delete the text of this Subsection and substitute the following:

A. General

All work and material for the contract, including any change order work, shall be done and furnished at the sole risk of the Contractor until the entire improvement has been completed and final acceptance granted by the Engineer, except as provided in this subsection.

The Contractor shall rebuild, repair, restore, and make good all damages to any portion of the permanent or temporary work occurring before the final acceptance date and shall bear all the expense to do so, except damage to the permanent work caused by:

1. Acts of God. This is defined as cataclysmic natural phenomena such as tornadoes, earthquakes, floods, and officially declared natural disasters.
2. Acts of the public enemy or governmental authority.

Provided, however, that these exceptions shall not apply should damages result from the Contractor's failure to take reasonable precautions or to exercise sound engineering and construction practices in conducting the work.

If the performance of the work is delayed as a result of damage by others, an extension of contract time will be evaluated in accordance with Subsection 108.06.

B. Relief of Responsibility for Completed Work

The Contractor may be relieved of the duty of maintaining and protecting portions of the work that have been accepted in accordance with Subsection 105.16. If this is the case the Contractor will be relieved of the responsibility for damages to said completed portions of the work resulting from use by the public traffic, or from the action of the elements, or from any other cause, but not from damage resulting from the Contractor's operations or negligence.

C. Relief of Responsibility for Damage by Public Traffic

When it is necessary for public traffic to utilize a highway facility during construction, the Contractor will be relieved of responsibility for damages to the permanent work by public traffic under the following circumstances:

1. The work is in accordance with the contract plans or approved stage construction plans,
2. The work is on a section of roadway required by contract to be opened to public traffic, and
3. The traffic control is in accordance with the approved traffic control plans.

If traffic is relocated to another section of roadway, the Contractor shall resume responsibility for the work until such time as the section of roadway is again open to public traffic or the Contractor submits a written request for work that is completed to a point where relief can be granted in accordance with paragraph B above.

D. Repair of Damage

The Contractor shall promptly repair all damage to either temporary or permanent work as directed by the Engineer. For damage qualifying for relief under Paragraphs A, B and C above, payment will be made using the method(s) deemed appropriate by the Engineer, either: (1) at contract unit prices, (2) in accordance with 104.03, (3) in accordance with 109.03 or, (4) the Engineer may elect to have the repair work done by others or by State forces. Payment will be limited to repair of damaged work only. No payment will be made for delay or disruption caused by damage to, or repair of, the temporary or permanent work.

ON PAGE 110, SUBSECTION 109.03- EXTRA AND FORCE ACCOUNT WORK

Delete the second paragraph and substitute, without indentation, the following:

Additional markups for overhead and profit for work performed by the prime Contractor, above the percentages in parts 1, 3 and 4 above, will not be allowed.

ON PAGE 126, SUBSECTION 205.03- CONSTRUCTION REQUIREMENTS

Delete the fifth paragraph and substitute the following:

In lieu of Idaho T-74, the standard density of coarse granular material may be determined in accordance with the following standard method:

In the sixth paragraph, delete “ASHTO” and substitute “AASHTO”.

ON PAGE 128, SUBSECTION 205.03- CONSTRUCTION REQUIREMENTS

Add to the first sentence:

, for material having a maximum dry density greater than 1900 kg/m3 (118.5 lb./CF), 100 percent standard density, uncorrected before applying AASHTO T-224.

ON PAGE 164, SUBSECTION 307.01- DESCRIPTION

Delete the text of this subsection and substitute the following:

This work shall consist of furnishing and placing one or more courses of open-graded rock base (rock cap) on a prepared surface in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established.

ON PAGE 186, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Move the gradation table below the last sentence of the first paragraph.

ON PAGE 187, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Delete the first sentence of the second paragraph and substitute the following:

> The Contractor shall obtain a minimum of three mix samples from each test section in the presence of the Engineer. Each mix sample shall consist of a minimum of 80 pounds of mix. Each sample shall be placed in Department approved storage containers, properly identified, and immediately submitted to the Engineer. Each 80 pound mix sample will be split by the Engineer at the Department testing laboratory in accordance with WAQTC – TM5, with half tested for acceptance and half retained by the Engineer for dispute resolution, if requested and approved.

ON PAGE 188, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Delete Part 3 and substitute the following:

3. The average AASHTO T30 gradations of three randomly selected mix samples shall meet the requirements of Subsection 405.03F-Mixing for the acceptance test strip. If the test strip consists of one test section, the three mix samples will be used to determine the average AASHTO T30 gradation. If the test strip consists of more than one test section, three mix samples from the test strip will be randomly selected for AASHTO T30 gradation testing. The requirements of 703.05 (sand equivalent, fracture and flat and elongated) and 405.02 (fine aggregate angularity) shall be met based on the average tests results of the three cold feed aggregate samples.

ON PAGE 191, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Add the following to the first partial paragraph:

> The maximum specific gravity value will be determined in accordance with the procedure in Idaho T-125, Acceptance Test Strip for Plant Mix Pavement.

ON PAGE 215, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS

Add the following to the third full paragraph:

> Testing may be performed on the coarse and fine aggregates together or separately. If testing is performed on the coarse and fine aggregates together the blend percentage must be reported on the test and be within plus or minus 2 percent of the blend percentage used in the mix design. When tested separetely, mitigation shall be based on the aggregate requiring the most mitigation.

Add the following after the sixth full paragraph:

> Fly ash, if used in the concrete mix, shall not have a CaO content more than 2 percent above the CaO content of the fly ash used for AASHTO T 303 testing. If the fly ash has a CaO content greater than 2 percent above the fly ash used for testing, additional AASHTO T 303 testing at the higher CaO content shall be required.

ON PAGE 222, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS

Delete Part 10 and substitute the following:

10. The Contractor shall furnish concrete that will have a temperature of at least 50 F (10 C) and not more than 85 F (29 C) at the time of placing.

Delete the first sentence of Part F and substitute the following:

F. Temperature Limitations and cutoff Dates. Concrete pavement may be placed between May 1 and October 1 with the following precautions: When concreting is authorized during cold weather, the temperature of the mixed concrete shall be not less than 50 F (10 C) and not more than 85 F (29 C) at the time of placing.

Delete the first sentence of the second paragraph of Part F and substitute the following:

The temperature of the concrete shall not exceed 85 F (29 C) at time of placement.

ON PAGE 251, SUBSECTION 411.03- CONSTRUCTION REQUIREMENTS

Delete the first paragraph and substitute the following:

O. *Opening Pavement to Traffic*. Full use of the pavement by all classes of traffic will not be permitted until field cured test specimens have attained a compressive strength of not less than 3500 psi (24 MPa).

ON PAGE 253, SUBSECTION 412.02- MATERIALS

Add the following at the beginning of the third paragraph:

All plant mix seal designs shall use a minimum on one-half percent (1/2%) approved anti-stripping additive by weight of asphalt.

ON PAGE 254, SUBSECTION 412.03- CONSTRUCTION REQUIREMENTS

Delete in Part E the words "Part E" and substitute "Part A".

Delete in Part G the words "Part H" and substitute "Part I".

Delete in Part H the words "Part I" and substitute "Part B".

Delete in Part I the words "Part J" and substitute "Part K".

ON PAGE 262, SUBSECTION 502.01- DESCRIPTION

Add the following to Part A:

Except when used in structural foundation and bridge applications, Class 22 (15.0), class 15 (10.5) and Seal Concrete do not require AASHTO T 303 mitigation testing as part of the mix design and do not require the use of ASR mitigation measures.

ON PAGE 265, SUBSECTION 502.01- DESCRIPTION

Effective July 1, 2005: Delete the last sentence and substitute the following:

Manufacturers furnishing precast concrete products shall hold current certification under the NPCA Plant Certification program. Manufacturers holding current PCI plant certification per Section 506 are exempt from NPCA plant certification requirements.

ON PAGE 267, SUBSECTION 502.02- MATERIALS

Add after the second test method “WAQTC TM-2”:

When concrete is delivered by means of a concrete pump, samples shall be obtained at the final point of placement (discharge pipe).

The Contractor shall provide a safe and accessible platform for sampling the fresh concrete in close proximity and elevation to the final point of placement.

ON PAGE 268, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete the last partial paragraph.

ON PAGE 269, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete the first partial paragraph and substitute the following after the table.

> Laboratory specimens, produced in accordance with AASHTO T 303, shall be required using the cement, fly ash, and other mitigative additives proposed for use in the mix design. Expansion of mortar bars shall not exceed 0.10 percent with the addition of fly ash, lithium, or other additives. Testing may be performed on the coarse and fine aggregates together or separately. If testing is performed on the coarse and fine aggregates together the blend percentage must be reported on the test and be within plus or minus 2 percent of the blend percentage used in the mix design. When tested separetely, mitigation shall be based on the aggregate requiring the most mitigation.

Add the following after the second full paragraph:

> Fly ash, if used in the concrete mix, shall not have a CaO content more than 2 percent above the CaO content of the fly ash used for AASHTO T 303 testing. If the fly ash has a CaO content greater than 2 percent above the fly ash used for testing, additional AASHTO T 303 testing at the higher CaO content shall be required.

ON PAGE 275, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete from the last sentence of the first Paragraph of Part 1 " an Engineer registered in the State of Idaho" and substitute " a Professional Engineer licensed in the State of Idaho".

ON PAGE 277, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Add the following after Part 3a.

(5) Falsework and Forms Supporting Concrete Work on Steel Structures.

a. Loading of Girder Webs: Falsework and forms supporting the concrete work on steel structures shall be constructed so that any loads applied to girder webs shall be applied within 6” (150mm) of a flange or stiffener and shall be distributed in a manner that will not produce local distortion of the web.

b. Lateral Loading of Girder Flanges: Temporary struts and ties shall be provided as necessary to resist lateral loads applied to the girder flanges and to prevent appreciable relative vertical movement (0.2” (5mm) maximum) between the edge of deck form and the adjacent steel girder.

ON PAGE 310, SUBSECTION 504.01- DESCRIPTION

Delete the first sentence of Part H and substitute the following:

The Contractor shall submit the proposed plan for erection to the Engineer for approval.

Delete the next to last sentence of the second paragraph of Part H and substitute the following:

The calculation and plan shall be stamped by a Professional Engineer licensed in the State of Idaho.

Delete the third full paragraph.

ON PAGE 338, SUBSECTION 505.03- CONSTRUCTION REQUIREMENTS

Add the following after the first sentence of the second paragraph:

The Contractor shall notify the Engineer a minimum of seven (7) calendar days prior to driving each test pile. The Engineer will require two (2) working days after each test pile is driven to evaluate each test pile result and determine the required pile length.

ON PAGE 380, SUBSECTION 512.01- DESCRIPTION

Delete from the second sentence of Part A “registered” and substitute "licensed".

ON PAGE 398, SUBSECTION 610.03- CONSTRUCTION REQUIREMENTS

Delete the first, third, fifth, and seventh paragraphs.

ON PAGE 399, SUBSECTION 610.03- CONSTRUCTION REQUIREMENTS

Delete last two paragraphs.

ON PAGE 399, SUBSECTION 610.05- BASIS OF PAYMENT

Add the following:

When barbarm/security attachment for Type 4 fence is called for on the plans, no separate payment will be made and all work associated with attachments shall be incidental to the cost of the fence.

ON PAGE 411, SUBSECTION 616.03- CONSTRUCTION REQUIREMENTS

Delete from the second sentence of the first Paragraph "an Engineer registered in the state of Idaho" and substitute "a Professional Engineer licensed in the State of Idaho".

Add "Professional" in the last sentence of the first paragraph after "said ".

ON PAGE 412, SUBSECTION 616.03- CONSTRUCTION REQUIREMENTS

Add to the second full paragraph, “if approved by the engineer”.

Delete the last sentence of the third full paragraph.

ON PAGE 433, SUBSECTION 622.02- MATERIALS

Delete the text of this subsection and substitute the following:

Materials shall meet the requirements of Section 502-Concrete and the plans.

ON PAGE 438, SUBSECTION 625.02- MATERIALS

Add the following:

SiIicone Sealant……704.05

ON PAGE 438, SUBSECTION 625.03- CONSTRUCTION REQUIREMENTS

Add the following after the second paragraph:

Silicone Sealant shall be applied in accordance with the manufacturer's recommendations.

ON PAGE 439, SUBSECTION 626.02- MATERIALS

Delete the first sentence of the third paragraph and substitute the following:

"Pavement marking tape shall be 4 in. (100mm) wide retroreflective pressure sensitive tape manufactured for use as pavement markings suitable for use on either concrete or asphalt surfaces.

Delete from the fourth sentence of the third paragraph the words "striping materials" and substitute "pavement marking tape".

Delete from the first sentence of the fourth paragraph the words "striping material" and substitue "pavement marking tape".

ON PAGE 440, SUBSECTION 626.02- MATERIALS

Add the following after the first partial paragraph:

Temporary rigid raised pavement markers, non-snow-plowable, shall be suitable for use on either concrete or asphalt surfaces as required and shall be made of high impact durable material that will not deflect or deform under tire impacts. Markers shall be yellow for two-way centerline applications and shall have a bi-direction retro-reflective configuration. Markers shall be either yellow or white as required for edge line applications and shall have a mono-directional retro-reflective configuration. Markers shall be white for one-way lane separation applications and shall have a bi-directional retro-reflective configuration. Markers shall not have studs or mechanical attachments. Markers shall be a nominal 4-inch (100 mm) outside dimension, with a minimum installed height of 0.75-inch (18 mm), as shown on the plans or as directed. The reflective surface area shall be a minimum of one inch square (625 mm^2). The specific intensity (SI) (candlepower/foot-candle) for each white retro-reflective surface at 0.2° observation angle shall be not less than the following when the incident light is parallel to the base of the marker in accordance with ASTM D 4280:

Horizontal Entrance Angle	S I
0 degrees	3.0
20 degrees	1.5

The specific intensity for each yellow marker surface shall be 60% of the value for white.

ON PAGE 442, SUBSECTION 626.03- CONSTRUCTION REQUIREMENTS

Add the following:

All temporary rigid raised pavement markers, non-snow-plowable, used as a supplement to pavement markings and placed in conjunction with tubular markers to temporarily mark lane separation lines between bi-directional traffic shall be placed as shown on the plans or as directed. Markers shall be fastened to the pavement by adhesion according to the manufacturer's recommendations so they will remain firm. Nailing will not be a satisfactory means of fastening markers to the pavement. Markers shall be protected from traffic until the adhesive has properly cured.

The Contractor shall visually inspect all installed markers at least twice daily and shall replace any lost, damaged or displaced markers that day. Markers shall be removable from asphalt and concrete pavements, either manually or by mechanical devices, without the use of heat, grinding or blasting.

ON PAGE 443, SUBSECTION 626.04- METHOD OF MEASUREMENT

Add the following:

Temporary rigid raised pavement markers, non-snow-plowable, will be measure per each installed, complete in place.

ON PAGE 444, SUBSECTION 626.05- BASIS OF PAYMENT

Add the following Pay Item:

Temporary Rigid Raised Pavement Marker, Non-Snow-Plowable……..Each

ON PAGE 467, SUBSECTION 656.02- MATERIALS

Delete from the second Part 1 "(300 m)" and substitute "(300 mm)".

Delete Part 7 and substitute the following:

7. Lamps shall be 130 volt, clear traffic signal lamps or approved L.E.D. module, with lumen rating and light center as specified by the Institute of Transportation Engineers.

Delete from Part 8 "(300 m)" and substitute "(300 mm)".

ON PAGE 468, SUBSECTION 656.02- MATERIALS

Delete the first paragraph and substitute "Pedestrian signal heads shall be one-way illuminated by incandescent traffic signal lamp contained in each section, or by L.E.D. module with the addition of the following:"

Delete from Part 6 "125 volt" and substitute "120 volt".

Delete the text of Part 7 after the word "furnished".

ON PAGE 479, SUBSECTION 703.01- GENERAL REQUIREMENTS

Add to the first paragraph:

Values specified for the percent passing the #200 sieve shall have a ".0" added. (i.e. "3-9" shall be "3.0 - 9.0")

ON PAGE 481, SUBSECTION 703.02- FINE AGGREGATE FOR CONCRETE

Delete the second full paragraph and substitute the following:

The contractor shall perform AASHTO T 303, ASTM C1293 or ASTM C295 testing to determine the potential Alkali Silica Reactivity of the aggregates. Aggregates found to be potentially reactive per AASHTO T 303, ASTM C1293, or ASTM C295 shall require mitigating measures. Aggregates with expansion greater than 0.10 percent as determined by AASHTO T 303, or greater than 0.04 percent as determined by ASTM C1293 will be considered potentially reactive. If ASTM C295 shows an aggregate composition containing greater than the indicated percentage for any of the following materials, the aggregate will be considered potentially reactive.

Mineral	Limit
Optically strained, microfractured, or microcrystalline quartz	5.0% (max)
Chert or chalcedony	3.0% (max)
Tridymite or cristobalite	1.0% (max)
Opal	0.5% (max)
Natural volcanic glass	3.0% (max)

ON PAGE 482, SUBSECTION 703.03- COARSE AGGREGATE FOR CONCRETE

Delete the sixth full paragraph and substitute the following:

The contractor shall perform AASHTO T 303, ASTM C1293 or ASTM C295 testing to determine the potential Alkali Silica Reactivity of the aggregates. Aggregates found to be potentially reactive per AASHTO T 303, ASTM C1293, or ASTM C295 shall require mitigating measures. Aggregates with expansions greater than 0.10 percent as determined by AASHTO T 303 or greater than 0.04 percent as determined by ASTM C1293 will be considered potentially reactive. If ASTM C295 shows an aggregate composition containing greater than the indicated percentage for any of the following materials, the aggregate will be considered potentially reactive.

Mineral	Limit
Optically strained, microfractured, or microcrystalline quartz	5.0% (max)
Chert or chalcedony	3.0% (max)
Tridymite or cristobalite	1.0% (max)
Opal	0.5% (max)
Natural volcanic glass	3.0% (max

ON PAGE 489, SUBSECTION 703.06- AGGREGATE FOR COVER COAT MATERIAL

Delete the table and subsequent paragraph and substitute the following:

Gradation Table

Sieve Size	Class A Urban	Class B Rural
	Percent Passing	
½ inch (12.5 mm)	100	100
3/8 inch (9.5 mm)	95 - 100	40 - 70
No. 4 (4.75 mm)	0 - 6	0 - 6
No. 8 (2.36 mm)	0 - 3	0 - 3
No. 200 (0.075 mm)	0 - 2.0	0 - 2.0

The aggregate for urban and rural cover coat material shall have a cleanness value of not less than 80.

ON PAGE 490, SUBSECTION 703.08- AGGREGATE FOR OPEN GRADED ROCK BASE (ROCK CAP)

Delete the last sentence and substitute the following:

The minimum sample size tested shall be 65 lb (30 kg).

ON PAGE 491, SUBSECTION 703.11- AGGREGATE FOR GRANULAR SUBBASE

Delete the last sentence and substitute the following:

The minimum sample size tested shall be 65 lb (30 kg).

ON PAGE 494, SUBSECTION 704.02- JOINT SEALER FOR ASPHALT AND CONCRETE PAVEMENTS

Delete "ASTM D 3405" and substitute "ASTM D6690 Type II"

ON PAGE 497, SUBSECTION 706.01- GENERAL REQUIREMENTS FOR CONCRETE PIPE

Delete "cement" from the first sentence.

Add the following:

Effective July 1, 2005, manufacturers furnishing concrete pipe must hold current certification under either the NPCA Plant Certification program or the ACPA Q-Cast Plant Certification program.

ON PAGE 526, SUBSECTION 709.05- WATER REDUCING ADMIXTURES

Add the following:

709.06 Lithium Nitrate Admixtures. Lithium nitrate admixture shall consist of a 30% aqueous lithium nitrate solution. The lithium nitrate admixture used in the concrete shall be the same brand and from the same manufacturer as that reported in the mix design and used in the concrete alkali-silica reaction mitigation testing. Use shall follow all manufacturer's recommendations.

ON PAGE 527 SUBSECTION 710.02- WOOD SIGN POSTS AND SNOW POLES

Delete from the heading and throughout the subsection "and Snow poles".

ON PAGE 537, SUBSECTION 711.04- RIPRAP

Delete from the first sentence of the first paragraph: "suitable salvaged concrete, or concrete in sacks".

ON PAGE 551, SUBSECTION 714.01- GENERAL REQUIREMENTS

Delete the second and third sentences of the first paragraph and substitute the following:

When the contract or source approval requires fly ash concrete, Class F shall be used , and the available alkalies in the fly ash (as Na2O)shall not exceed 1.5 percent. In addition Calcium Oxcide (CaO) content shall not exceed 11 percent.

ON PAGE 558 SUBSECTION 718.05- DRAINAGE GEOTEXTILE PROPERTY REQUIREMENTS

Delete the table and substitute the following:

Geotextile Property	Test Method	Minimum Average Roll Values	
		Type I (1)	Type II
Grab Tensile Strength – lb. (N) (In either principal direction)	ASTM D 4632	80 (365)	180 (800)
Grab Elongation (%)	ASTM D 4632	NA	
Puncture Strength – lb. (N)	ASTM D 4833	35 (155)	80 (355)
Apparent Opening Size (AOS) (Std. Sieve)	ASMT D 4751	0.212 mm (#70) Or Finer	
Permittivity (sec-1)	ASMT D 4491	0.7	0.7

ON PAGE 558 SUBSECTION 718.06- RIPRAP/EROSION CONTROL GEOTEXTILE PROPERTY REQUIREMENTS

Delete the table and substitute the following:

Geotextile Property	Test Method	Minimum Average Roll Values	
		Type I (1)	Type II
Grab Tensile Strength – lb. (N) (In either principal direction)	ASTM D 4632	130 (580)	200 (890)
Grab Elongation (%)	ASTM D 4632	15	15
Puncture Strength – lb. (N)	ASTM D 4833	60 (270)	80 (355)
Trapezoidal Tear – lb. (N)	ASTM D 4533	40 (180)	50 (225)
Apparent Opening Size (AOS) (Standard Sieve)	ASTM D 4751	#50 (0.3 mm) or Finer	
Permittivity (sec-1)	ASTM D 4491	0.5	0.5
Ultraviolet (UV) Radiation Stability	ASTM D 4355	70% Strength Retained @150 hrs.	

ON PAGE 559 SUBSECTION 718.07- SUBGRADE SEPARATION GEOTEXTILE PROPERTY REQUIREMENTS

Delete the table and substitute the following:

Geotextile Property	**Test Method**	**Minimum Average Roll Values**	
		Type I	Type II [1]
Grab Tensile Strength – lb (N) (In either principal direction) [2]	ASTM D 4632	180/115 (800/510)	270/180 (1200/800)
Grab Elongation (%) [2]	ASTM D 4632	<50%/≥50%	<50%/≥50%
Puncture Strength – lb (N) [2]	ASTM D 4833	70/40 (310/180)	100/75 (445/335)
Trapezoidal Tear Strength – lb (N)	ASTM D 4533	70/40 (310/180)	100/75 (445/335)
Apparent Opening Size (AOS) [3] (Standard Sieve)	ASTM D 4751 COE CW-002215	#30 (0.60 mm) or Finer	
Permittivity (sec-1) [3]	ASTM D 4491	0.02	0.02

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FOR 2004 IDAHO STANDARD SPECIFICATIONS

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*** Revised from September 2004 Version**

SUPPLEMENTAL SPECIFICATIONS

ON PAGE 3, SUBSECTION 101.01- ABBREVIATIONS

Incorporate the following in alphabetic order:

ACPA American Concrete Pipe Association
NPCA National Precast Concrete Association

ON PAGE 4, SUBSECTION 101.02- DEFINITIONS

Delete the last paragraph and substitute the following:

Contract items are numbered to correspond to sections of these specifications. Special provision contract items are numbered beginning with an "S" followed by either a section number to which work is similar, or to a 900 generic series number.

ON PAGE 18, SUBSECTION 104.03- CHANGES AND EXTRA WORK

In the first sentence of Part 4 delete "720" and replace with "seven (7) calendar".

ON PAGE 19, SUBSECTION 104.03- CHANGES AND EXTRA WORK *

Delete Part 9, and substitute the following:

9. Prime Contractor's Overhead and Profit: When extra work is performed by an approved first or lower tier subcontractor, or by owner-operator, compensation to the prime Contractor for overhead and profit will be in accordance with the following:

		Prime Contractor's Compensation
To	$10,000	10%
Over	$10,000	$1,000 + 5% of excess over $10,000

Bid items with a price per unit in the original contract, which are included in the extra work, are not eligible for additional overhead and profit. Prime Contractor's overhead and profit will be calculated on the total amount of subcontracted and/or owner-operator work.

Delete the first sentence of Part 10 and substitute the following:

> It is considered that overhead and profit for the subcontractor are included in the agreed price, and no additional compensation, above that provided for the prime Contractor's overhead and profit, will be allowed.

ON PAGE 23, SUBSECTION 104.06- MAINTENANCE OF PUBLIC HAUL ROADS

Delete from the first full sentence, "205.17"

ON PAGE 25, SUBSECTION 105.01- AUTHORITY OF THE ENGINEER AND SUSPENSION OF WORK

Delete Parts 3, 4, & 5 and substitute the following:

3. Upon receipt, the Engineer will evaluate the Contractor's request. If the Engineer agrees that the cost and/or time required for the performance of the contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the Engineer will make an adjustment and modify the contract in writing accordingly. The Engineer will notify the Contractor of the determination whether or not an adjustment of the contract is warranted.

4. In making the contract adjustment a markup for profit will only be allowed on changed or extra work caused by the delay or suspension. No profit will be allowed on any other delay or suspension costs including, but not limited to, standby costs or extended indirect costs. Payment for changed and extra work will be made in accordance with Subsection 104.03.

5. No contract adjustment will be allowed unless the Contractor has submitted the request for adjustment within the time prescribed.

6. No contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided for or excluded under any other term or condition of this contract.

7. In case of suspension of work the Contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project; provide for normal drainage; protect erodible surfaces by approved erosion and sediment control measures; prevent water pollution and prevent damage by sedimentary deposits; and erect any necessary temporary structures, signs, or other facilities. During such period of suspension of work, the Contractor shall also properly and continuously maintain, in an acceptable growing condition, all living material in newly established plantings, seedings, and soddings furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

ON PAGE 26, SUBSECTION 105.02- PLANS AND WORKING DRAWINGS. *

Add the following at the end of the 2nd paragraph:

The Contractor shall furnish the Engineer one set of reproducible 3 mil mylar copies of the approved drawings prior to completion of the project for any item that becomes a permanent part of the completed structure.

ON PAGE 27, SUBSECTION 105.04- COORDINATION OF PLANS, SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS, AND SPECIAL PROVISIONS.

Add the following to the first partial paragraph.

The details shown in the bid schedule shall govern when in conflict with other project documents.

ON PAGE 34, SUBSECTION 105.17- CLAIMS FOR ADJUSTMENTS AND DISPUTES

Delete from the first sentence of the third full paragraph “6030” and substitute “60”.

ON PAGE 40, SUBSECTION 105.17- CLAIMS FOR ADJUSTMENTS AND DISPUTES *

Add the following after Part 2.

The Department and Contractor agree that all arbitration panels will be composed of three (3) members.

ON PAGE 64, SUBSECTION 105.20- VALUE ENGINEERING CHANGE PROPOSALS (VECP)

Delete (5) and substitute the following:

(5) If the VECP requires the services of a Professional Engineer as required by Idaho Code, the VECP shall be stamped by a Professional Engineer licensed in the State of Idaho.

ON PAGE 66, SUBSECTION 106.03- SAMPLES, TESTS, CITED SPECIFICATIONS

Add after the first paragraph:

Testing performed on the Contractor's behalf for plant mix designs, alkali-silica reactivity expansion and dispute resolution shall be performed under the direct supervision of a Professional Engineer licensed in the state where the testing is performed. Test reports shall be stamped by the supervising Professional * Engineer licensed in the state where the testing is performed. *

Add after the third paragraph:

Revised WAQTC, AASHTO, and Idaho test methods become effective when the test method is published in the Quality Assurance Manual. Revised AASHTO test methods not included in WAQTC become effective November 1 of the year published by AASHTO.

ON PAGE 66, SUBSECTION 106.04- CERTIFICATION OF MATERIALS *

Add the following:

Certification shall reference the project and item numbers for which the material is intended.

ON PAGE 68, SUBSECTION 106.08- FIELD LABORATORY *

Delete the first sentence of the second full paragraph and substitute the following:

The Contactor shall provide a commercially comparable, 200-ampere 125/250 volt service, single phase, four wire, 60 cycle AC service to the outlet of the field laboratory or field office, unless otherwise approved.

Delete the third, fourth, and fifth full paragraphs and substitute the following:

The Contractor shall provide a service for electrical hook-up. The service shall be equipped with a feeder assembly compatible with the requirements of the current National Electrical Code (NEC). This assembly shall be rated for 200 ampere service, unless otherwise approved.

ON PAGE 71, SUBSECTION 106.09- MATERIAL SOURCES

Add the following:

The Contractor shall be responsible for construction and maintenance of haul roads from materials sources to the site of the work or to the nearest public road. Maintenance shall include dust abatement.

Discharge of turbid waters which would create pollution shall not be allowed into any streams or other bodies of water.

ON PAGE 71, SUBSECTION 106.10- PREPARATION OF MATERIAL SOURCE

Delete the heading of this subsection and substitute the following

106.10 Preparation of Department Controlled Material Source.

ON PAGE 71, SUBSECTION 106.11- PRODUCTION OF MATERIAL

Delete from the second sentence of the first paragraph "designated sources," and substitute "department controlled sources,"

ON PAGE 81, SUBSECTION 107.11- CONTRACTOR'S RESPONSIBILITY FOR WORK

Delete the text of this Subsection and substitute the following:

A. General

All work and material for the contract, including any change order work, shall be done and furnished at the sole risk of the Contractor until the entire improvement has been completed and final acceptance granted by the Engineer, except as provided in this subsection.

The Contractor shall rebuild, repair, restore, and make good all damages to any portion of the permanent or temporary work occurring before the final acceptance date and shall bear all the expense to do so, except damage to the permanent work caused by:

1. Acts of God. This is defined as cataclysmic natural phenomena such as tornadoes, earthquakes, floods, and officially declared natural disasters.
2. Acts of the public enemy or governmental authority.

Provided, however, that these exceptions shall not apply should damages result from the Contractor's failure to take reasonable precautions or to exercise sound engineering and construction practices in conducting the work.

If the performance of the work is delayed as a result of damage by others, an extension of contract time will be evaluated in accordance with Subsection 108.06.

B. Relief of Responsibility for Completed Work

The Contractor may be relieved of the duty of maintaining and protecting portions of the work that have been accepted in accordance with Subsection 105.16. If this is the case the Contractor will be relieved of the responsibility for damages to said completed portions of the work resulting from use by the public traffic, or from the action of the elements, or from any other cause, but not from damage resulting from the Contractor's operations or negligence.

C. Relief of Responsibility for Damage by Public Traffic

When it is necessary for public traffic to utilize a highway facility during construction, the Contractor will be relieved of responsibility for damages to the permanent work by public traffic under the following circumstances:

1. The work is in accordance with the contract plans or approved stage construction plans,
2. The work is on a section of roadway required by contract to be opened to public traffic, and
3. The traffic control is in accordance with the approved traffic control plans.

If traffic is relocated to another section of roadway, the Contractor shall resume responsibility for the work until such time as the section of roadway is again open to public traffic or the Contractor submits a written request for work that is completed to a point where relief can be granted in accordance with paragraph B above.

D. Repair of Damage

The Contractor shall promptly repair all damage to either temporary or permanent work as directed by the Engineer. For damage qualifying for relief under Paragraphs A, B and C above, payment will be made using the method(s) deemed appropriate by the Engineer, either: (1) at contract unit prices, (2) in accordance with 104.03, (3) in accordance with 109.03 or, (4) the Engineer may elect to have the repair work done by others or by State forces. Payment will be limited to repair of damaged work only. No payment will be made for delay or disruption caused by damage to, or repair of, the temporary or permanent work.

ON PAGE 106, SUBSECTION 109.03- EXTRA AND FORCE ACCOUNT WORK *

Delete from Part 4 a "The Rental Rate Blue Book published by Dataquest, Inc.," and substitute "The Rental Rate Blue Book published by Equipment Watch (A PRIMEDIA Business Directories & Book Group),".

ON PAGE 109 & 110, SUBSECTION 109.03- EXTRA AND FORCE ACCOUNT WORK *

Delete Part 8 through the end of this subsection, and Substitute the following:

8. Prime Contractor's Overhead and Profit: When work on a force account basis is performed by an approved first or lower tier subcontractor, or by owner-operator, compensation to the prime Contractor for overhead and profit will be in accordance with the following:

		Prime Contractor's Compensation
To	$10,000	10%
Over	$10,000	$1,000 + 5% of excess over $10,000

Bid items with a price per unit in the original contract, which are included in Force Account work, are not eligible for additional overhead and profit. Prime Contractor's overhead and profit will be calculated on the total amount of subcontracted and/or owner-operator work.

Approval of this additional amount will be made after receipted invoices are furnished by the Contractor.

Force account work shall be adjusted daily upon duplicate report sheets furnished by the Engineer and signed by both parties, which daily reports shall thereafter be considered the true record of the force account work done.

ON PAGE 111, SUBSECTION 109.05- PARTIAL PAYMENTS *

Delete the last three paragraphs and substitute the following:

The Contractor shall pay each Subcontractor or supplier for satisfactory performance of its contract no later than 20 calendar days from receipt of each payment the Contractor receives from the Department. The Contractor shall return retainage to each Subcontractor or supplier within 20 calendar days after the subcontractor's or supplier's work is satisfactorily completed.

The Contractor shall certify with each estimate payment that payment to Subcontractors or suppliers has been made within the prescribed time frames. The certification will be made on forms provided by the Department, and returned within 20 calendar days of receiving the estimate payment.

These requirements shall also apply to first or lower tier subcontractors or suppliers.

ON PAGE 114, SUBSECTION 201.03- CONSTRUCTION REQUIREMENTS *

Delete the third paragraph and substitute the following:

Disposal of materials shall not be done by open burning.

ON PAGE 126, SUBSECTION 205.03- CONSTRUCTION REQUIREMENTS

Delete the fifth paragraph and substitute the following:

In lieu of Idaho T-74, the standard density of coarse granular material may be determined in accordance with the following standard method:

In the sixth paragraph, delete “ASHTO” and substitute “AASHTO”.

ON PAGE 128, SUBSECTION 205.03- CONSTRUCTION REQUIREMENTS *

Delete the portion of the first sentence after the colon and substitute the following:

> For materials having a maximum dry density of 120 lb/CF (1900 kg/m^3) or less, uncorrected before applying AASHTO T 224, 95 percent of standard density and for materials having a maximum dry density greater than 120 lb/CF (1900 kg/m^3), uncorrected before applying AASHTO T 224, 100 percent of standard density.

ON PAGE 139, SUBSECTION 212.02- MATERIALS *

Delete pipe subsection reference “708.21” and substitute “706”.

ON PAGE 151, SUBSECTION 212.05- BASIS OF PAYMENT *

Delete from the last sentenceof the first paragraph: "SSP-640" and substitute "Section 640".

ON PAGE 153, SUBSECTION 301.02- MATERIALS *

Delete the last two sentences of the last paragraph.

ON PAGE 156 & 157, SUBSECTION 303.02- MATERIALS *

Delete the second paragraph.

ON PAGE 164, SUBSECTION 307.01- DESCRIPTION

Delete the text of this subsection and substitute the following:

This work shall consist of furnishing and placing one or more courses of open-graded rock base (rock cap) on a prepared surface in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established.

ON PAGE 181, SUBSECTION 405.02- MATERIALS *

Delete "ASTM D4791" and substitute the following:

Idaho Field Operating Procedures (FOP) of the Quality Assurance Manual for ASTM D 4791.

ON PAGE 186, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Move the gradation table below the last sentence of the first paragraph.

ON PAGE 187, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Delete the first sentence of the second paragraph and substitute the following:

> The Contractor shall obtain a minimum of three mix samples from each test section in the presence of the Engineer. Each mix sample shall consist of a minimum of 80 pounds of mix. Each sample shall be placed in Department approved storage containers, properly identified, and immediately submitted to the Engineer. Each 80 pound mix sample will be split by the Engineer at the Department testing laboratory in accordance with WAQTC – TM5, with half tested for acceptance and half retained by the Engineer for dispute resolution, if requested and approved.

ON PAGE 188, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Delete Part 3 and substitute the following:

3. The average AASHTO T30 gradations of three randomly selected mix samples shall meet the requirements of Subsection 405.03F-Mixing for the acceptance test strip. If the test strip consists of one test section, the three mix samples will be used to determine the average AASHTO T30 gradation. If the test strip consists of more than one test section, three mix samples from the test strip will be randomly selected for AASHTO T30 gradation testing. The requirements of 703.05 (sand equivalent, fracture and flat and elongated) and 405.02 (fine aggregate angularity) shall be met based on the average tests results of the three cold feed aggregate samples.

ON PAGE 191, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Add the following to the first partial paragraph:

> The maximum specific gravity value will be determined in accordance with the procedure in Idaho T-125, Acceptance Test Strip for Plant Mix Pavement.

ON PAGE 215, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS

Add the following to the third full paragraph:

> Testing may be performed on the coarse and fine aggregates together or separately. If testing is performed on the coarse and fine aggregates together the blend percentage must be reported on the test and be within plus or minus 2 percent of the blend percentage used in the mix design. When tested separetely, mitigation shall be based on the aggregate requiring the most mitigation.

Add the following after the sixth full paragraph:

> Fly ash, if used in the concrete mix, shall not have a CaO content more than 2 percent above the CaO content of the fly ash used for AASHTO T 303 testing. If the fly ash has a CaO content greater than

2 percent above the fly ash used for testing, additional AASHTO T 303 testing at the higher CaO content shall be required.

ON PAGE 222, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS

Delete Part 10 and substitute the following:

10. The Contractor shall furnish concrete that will have a temperature of at least 50 F (10 C) and not more than 85 F (29 C) at the time of placing.

Delete the first sentence of Part F and substitute the following:

F. Temperature Limitations and cutoff Dates. Concrete pavement may be placed between May 1 and October 1 with the following precautions: When concreting is authorized during cold weather, the temperature of the mixed concrete shall be not less than 50 F (10 C) and not more than 85 F (29 C) at the time of placing.

Delete the first sentence of the second paragraph of Part F and substitute the following:

The temperature of the concrete shall not exceed 85 F (29 C) at time of placement.

ON PAGE 244, SUBSECTION 411.02- MATERIALS *

Add “409.01 and” in the first paragraph after the word “Subsection”.

ON PAGE 244, SUBSECTION 411.03- CONSTRUCTION REQUIREMENTS *

Add “409.01 and” in the first paragraph after the word “Subsection”.

ON PAGE 251, SUBSECTION 411.03- CONSTRUCTION REQUIREMENTS

Delete the first paragraph and substitute the following:

O. *Opening Pavement to Traffic*. Full use of the pavement by all classes of traffic will not be permitted until field cured test specimens have attained a compressive strength of not less than 3500 psi (24 MPa).

ON PAGE 253, SUBSECTION 412.02- MATERIALS

Add the following at the beginning of the third paragraph:

All plant mix seal designs shall use a minimum on one-half percent (1/2%) approved anti-stripping additive by weight of asphalt.

ON PAGE 254, SUBSECTION 412.03- CONSTRUCTION REQUIREMENTS

Delete in Part E the words "Part E" and substitute "Part A".

Delete in Part G the words "Part H" and substitute "Part I".

Delete in Part H the words "Part I" and substitute "Part B".

Delete in Part I the words "Part J" and substitute "Part K".

ON PAGE 262, SUBSECTION 502.01- DESCRIPTION

Add the following to Part A:

> Except when used in structural foundation and bridge applications, Class 22 (15.0), class 15 (10.5) and Seal Concrete do not require AASHTO T 303 mitigation testing as part of the mix design and do not require the use of ASR mitigation measures.

ON PAGE 265, SUBSECTION 502.01- DESCRIPTION

Effective July 1, 2005: Delete the last sentence and substitute the following:
Manufacturers furnishing precast concrete products shall hold current certification under the NPCA Plant Certification program. Manufacturers holding current PCI plant certification per Section 506 are exempt from NPCA plant certification requirements.

ON PAGE 267, SUBSECTION 502.02- MATERIALS

Add after the second test method "WAQTC TM-2":

> When concrete is delivered by means of a concrete pump, samples shall be obtained at the final point of placement (discharge pipe).
>
> The Contractor shall provide a safe and accessible platform for sampling the fresh concrete in close proximity and elevation to the final point of placement.

ON PAGE 268, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete the last partial paragraph.

ON PAGE 269, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete the first partial paragraph and substitute the following after the table.

> Laboratory specimens, produced in accordance with AASHTO T 303, shall be required using the cement, fly ash, and other mitigative additives proposed for use in the mix design. Expansion of mortar bars shall not exceed 0.10 percent with the addition of fly ash, lithium, or other additives. Testing may be performed on the coarse and fine aggregates together or separately. If testing is performed on the coarse and fine aggregates together the blend percentage must be reported on the test and be within plus or minus 2 percent of the blend percentage used in the mix design. When tested separetely, mitigation shall be based on the aggregate requiring the most mitigation.

Add the following after the second full paragraph:

> Fly ash, if used in the concrete mix, shall not have a CaO content more than 2 percent above the CaO content of the fly ash used for AASHTO T 303 testing. If the fly ash has a CaO content greater than 2 percent above the fly ash used for testing, additional AASHTO T 303 testing at the higher CaO content shall be required.

ON PAGE 275, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete from the last sentence of the first Paragraph of Part 1 "an Engineer registered in the State of Idaho" and substitute "a Professional Engineer licensed in the State of Idaho".

ON PAGE 277, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Add the following after Part 3a.

(5) Falsework and Forms Supporting Concrete Work on Steel Structures.

a. Loading of Girder Webs: Falsework and forms supporting the concrete work on steel structures shall be constructed so that any loads applied to girder webs shall be applied within 6" (150mm) of a flange or stiffener and shall be distributed in a manner that will not produce local distortion of the web.

b. Lateral Loading of Girder Flanges: Temporary struts and ties shall be provided as necessary to resist lateral loads applied to the girder flanges and to prevent appreciable relative vertical movement (0.2" (5mm) maximum) between the edge of deck form and the adjacent steel girder.

(6) Add the following procedure for determining the lateral pressure of fluid concrete when * pozzolans or admixtures are used in the concrete mix:

For concrete made with pozzolans or admixtures and placed with normal internal vibration to a depth of 4 ft. or less, formwork can be designed for a lateral pressure as follows:

p = lateral pressure, psf
R = rate of placement, ft./hr.
T = temperature of concrete during placing, deg F
Cc = chemistry coefficient;
1.2 for cement type I and III with a retarder*
1.2 for blends containing fly ash without a retarder*
1.4 for blends containing fly ash with a retarder*

* retarders include any admixture that delays setting of concrete

For columns:

$$p = Cc [150 + 9000 R / T]$$

with a maximum of (3000)(Cc) psf, a minimum of 600 psf, but in no case greater than wh.

For walls:

$$p = Cc [150 + 43,400 / T + 2800 R / T]$$

with a maximum of (2000)(Cc) psf, a minimum of 600 psf, but in no case greater than wh.

For the purpose of applying the pressure formulas, columns are defined as elements with no plan dimension exceeding 6.5 feet. Walls are defined as vertical elements with at least one plan dimension greater than 6.5 feet.

**This specification is a modification of ACI Manual of Concrete Practice Part 4, 2004 Subsection 2.2.2, Lateral pressure of concrete.

ON PAGE 285, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS *

Delete from the Table, Part 2b and substitute the following:

b. Approach slabs, and bottom slabs of box girders (with falsework in place).

ON PAGE 296, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS *

Delete "approach slabs" from the second paragraph of Part A. Water Cure.

ON PAGE 310, SUBSECTION 504.01- DESCRIPTION

Delete the first sentence of Part H and substitute the following:

The Contractor shall submit the proposed plan for erection to the Engineer for approval.

Delete the next to last sentence of the second paragraph of Part H and substitute the following:

The calculation and plan shall be stamped by a Professional Engineer licensed in the State of Idaho.

Delete the third full paragraph.

ON PAGE 338, SUBSECTION 505.03- CONSTRUCTION REQUIREMENTS

Add the following after the first sentence of the second paragraph:

The Contractor shall notify the Engineer a minimum of seven (7) calendar days prior to driving each test pile. The Engineer will require two (2) working days after each test pile is driven to evaluate each test pile result and determine the required pile length.

ON PAGE 380, SUBSECTION 512.01- DESCRIPTION

Delete from the second sentence of Part A “registered” and substitute "licensed".

ON PAGE 398, SUBSECTION 610.03- CONSTRUCTION REQUIREMENTS

Delete the first, third, fifth, and seventh paragraphs.

ON PAGE 399, SUBSECTION 610.03- CONSTRUCTION REQUIREMENTS

Delete last two paragraphs.

ON PAGE 399, SUBSECTION 610.05- BASIS OF PAYMENT

Add the following:

When barbarm/security attachment for Type 4 fence is called for on the plans, no separate payment will be made and all work associated with attachments shall be incidental to the cost of the fence.

ON PAGE 411, SUBSECTION 616.03- CONSTRUCTION REQUIREMENTS

Delete from the second sentence of the first Paragraph "an Engineer registered in the state of Idaho" and substitute "a Professional Engineer licensed in the State of Idaho".

Add "Professional" in the last sentence of the first paragraph after "said ".

ON PAGE 412, SUBSECTION 616.03- CONSTRUCTION REQUIREMENTS

Add to the second full paragraph, “if approved by the engineer”.

Delete the last sentence of the third full paragraph.

Add after the fifth full paragraph: *

Anchors bolts shall be installed plumb plus or minus one degree. The double nuts shall be installed individually and tightened snug tight. “Snug tight” means either the tightness reached by (1) a few blows from an impact wrench, or (2) the full effort of a man using a spud wrench. At least three threads of the anchor bolt shall be visible above the second nut.

High strength structural bolts shall be tightened in accordance with Subsection 504.03.L.2

ON PAGE 421, SUBSECTION 619.03- CONSTRUCTION REQUIREMENTS *

Add after the 10th paragraph:

Anchor base assemblies shall have double nuts and be individually tightened snug tight. “Snug tight” means either the tightness reached by (1) a few blows from an impact wrench, or (2) the full effort of a man using a spud wrench. At least three threads of the anchor bolt shall be visible above the second nut.

ON PAGE 422, SUBSECTION 619.03- CONSTRUCTION REQUIREMENTS *

Delete the first and second sentences in the first paragraph and substitute the following:

The support coupling device installation shall be in accordance with manufacturer recommendations.

ON PAGE 427, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS *

Add to the first paragraph of Part B:

Chemicals for treating weeds shall be applied in accordance with manufacturer recommendations.

ON PAGE 433, SUBSECTION 622.02- MATERIALS

Delete the text of this subsection and substitute the following:

Materials shall meet the requirements of Section 502-Concrete and the plans.

ON PAGE 438, SUBSECTION 625.02- MATERIALS

Add the following:

SiIicone Sealant……704.05

ON PAGE 438, SUBSECTION 625.03- CONSTRUCTION REQUIREMENTS

Add the following after the second paragraph:

Silicone Sealant shall be applied in accordance with the manufacturer's recommendations.

ON PAGE 439, SUBSECTION 626.02- MATERIALS

Delete the first sentence of the third paragraph and substitute the following:

"Pavement marking tape shall be 4 in. (100mm) wide retroreflective pressure sensitive tape manufactured for use as pavement markings suitable for use on either concrete or asphalt surfaces.

Delete from the fourth sentence of the third paragraph the words "striping materials" and substitute "pavement marking tape".

Delete from the first sentence of the fourth paragraph the words "striping material" and substitute "pavement marking tape".

ON PAGE 440, SUBSECTION 626.02- MATERIALS

Add the following after the first partial paragraph:

Temporary rigid raised pavement markers, non-snow-plowable, shall be suitable for use on either concrete or asphalt surfaces as required and shall be made of high impact durable material that will not deflect or deform under tire impacts. Markers shall be yellow for two-way centerline applications and shall have a bi-direction retro-reflective configuration. Markers shall be either yellow or white as required for edge line applications and shall have a mono-directional retro-reflective configuration. Markers shall be white for one-way lane separation applications and shall have a bi-directional retro-reflective configuration. Markers shall not have studs or mechanical attachments. Markers shall be a nominal 4-inch (100 mm) outside dimension, with a minimum installed height of 0.75-inch (18 mm), as shown on the plans or as directed. The reflective surface area shall be a minimum of one inch square (625 mm^2). The specific intensity (SI) (candlepower/foot-candle) for each white retro-reflective surface at 0.2° observation angle shall be not less than the following when the incident light is parallel to the base of the marker in accordance with ASTM D 4280:

Horizontal Entrance Angle	S I
0 degrees	3.0
20 degrees	1.5

The specific intensity for each yellow marker surface shall be 60% of the value for white.

ON PAGE 442, SUBSECTION 626.03- CONSTRUCTION REQUIREMENTS

Add the following:

All temporary rigid raised pavement markers, non-snow-plowable, used as a supplement to pavement markings and placed in conjunction with tubular markers to temporarily mark lane separation lines between bi-directional traffic shall be placed as shown on the plans or as directed. Markers shall be fastened to the pavement by adhesion according to the manufacturer's recommendations so they will remain firm. Nailing will not be a satisfactory means of fastening markers to the pavement. Markers shall be protected from traffic until the adhesive has properly cured.

The Contractor shall visually inspect all installed markers at least twice daily and shall replace any lost, damaged or displaced markers that day. Markers shall be removable from asphalt and concrete pavements, either manually or by mechanical devices, without the use of heat, grinding or blasting.

ON PAGE 443, SUBSECTION 626.04- METHOD OF MEASUREMENT

Add the following:

Temporary rigid raised pavement markers, non-snow-plowable, will be measure per each installed, complete in place.

ON PAGE 444, SUBSECTION 626.05- BASIS OF PAYMENT

Add the following Pay Item:

Temporary Rigid Raised Pavement Marker, Non-Snow-Plowable……..Each

ON PAGE 458, SUBSECTION 634.02 – MATERIALS *

Add the following:

The Type 1-A Mailbox Support - 4x4 Wooden Post shall conform to the requirements of Subsection 710.02 Wood Sign Posts and Snow Poles.

ON PAGE 467, SUBSECTION 656.02- MATERIALS

Delete the second sentence of the fifth paragraph and substitute the following: *

Each bolt shall be fitted with three nuts and two washers.

Delete from the second Part 1 "(300 m)" and substitute "(300 mm)".

Delete Part 7 and substitute the following:

7. Lamps shall be 130 volt, clear traffic signal lamps or approved L.E.D. module, with lumen rating and light center as specified by the Institute of Transportation Engineers.

Delete from Part 8 "(300 m)" and substitute "(300 mm)".

ON PAGE 468, SUBSECTION 656.02- MATERIALS

Delete the first paragraph and substitute "Pedestrian signal heads shall be one-way illuminated by incandescent traffic signal lamp contained in each section, or by L.E.D. module with the addition of the following:"

Delete from Part 6 "125 volt" and substitute "120 volt".

Delete the text of Part 7 after the word "furnished".

ON PAGE 479, SUBSECTION 703.01- GENERAL REQUIREMENTS

Add to the first paragraph:

Values specified for the percent passing the #200 sieve shall have a ".0" added. (i.e. "3-9" shall be "3.0 - 9.0")

ON PAGE 481, SUBSECTION 703.02- FINE AGGREGATE FOR CONCRETE

Delete the second full paragraph and substitute the following:

The contractor shall perform AASHTO T 303, ASTM C1293 or ASTM C295 testing to determine the potential Alkali Silica Reactivity of the aggregates. Aggregates found to be potentially reactive per AASHTO T 303, ASTM C1293, or ASTM C295 shall require mitigating measures. Aggregates with expansion greater than 0.10 percent as determined by AASHTO T 303, or greater than 0.04 percent as determined by ASTM C1293 will be considered potentially reactive. If ASTM C295 shows an aggregate composition containing greater than the indicated percentage for any of the following materials, the aggregate will be considered potentially reactive.

Mineral	Limit
Optically strained, microfractured, or microcrystalline quartz	5.0% (max)
Chert or chalcedony	3.0% (max)
Tridymite or cristobalite	1.0% (max)
Opal	0.5% (max)
Natural volcanic glass	3.0% (max)

ON PAGE 482, SUBSECTION 703.03- COARSE AGGREGATE FOR CONCRETE

Delete the sixth full paragraph and substitute the following:

The contractor shall perform AASHTO T 303, ASTM C1293 or ASTM C295 testing to determine the potential Alkali Silica Reactivity of the aggregates. Aggregates found to be potentially reactive per AASHTO T 303, ASTM C1293, or ASTM C295 shall require mitigating measures. Aggregates with expansions greater than 0.10 percent as determined by AASHTO T 303 or greater than 0.04 percent as determined by ASTM C1293 will be considered potentially reactive. If ASTM C295 shows an aggregate composition containing greater than the indicated percentage for any of the following materials, the aggregate will be considered potentially reactive.

Mineral	Limit
Optically strained, microfractured, or microcrystalline quartz	5.0% (max)
Chert or chalcedony	3.0% (max)
Tridymite or cristobalite	1.0% (max)
Opal	0.5% (max)
Natural volcanic glass	3.0% (max)

ON PAGE 489, SUBSECTION 703.06- AGGREGATE FOR COVER COAT MATERIAL

Delete the table and subsequent paragraph and substitute the following:

Gradation Table

Sieve Size	Class A Urban	Class B Rural
	Percent Passing	
½ inch (12.5 mm)	100	100
3/8 inch (9.5 mm)	95 - 100	40 - 70

No. 4 (4.75 mm)	0 - 6	0 - 6
No. 8 (2.36 mm)	0 - 3	0 - 3
No. 200 (0.075 mm)	0 - 2.0	0 - 2.0

The aggregate for urban and rural cover coat material shall have a cleanness value of not less than 80.

ON PAGE 490, SUBSECTION 703.08- AGGREGATE FOR OPEN GRADED ROCK BASE (ROCK CAP)

Delete the last sentence and substitute the following:

The minimum sample size tested shall be 65 lb (30 kg).

ON PAGE 491, SUBSECTION 703.11- AGGREGATE FOR GRANULAR SUBBASE

Delete the last sentence and substitute the following:

The minimum sample size tested shall be 65 lb (30 kg).

ON PAGE 492, SUBSECTION 703.12- SAMPLING AND TESTING *

Delete "ASTM D4791" and substitute the following:

Idaho Field Operating Procedures (FOP) of the Quality Assurance Manual for ASTM D 4791.

ON PAGE 494, SUBSECTION 704.02- JOINT SEALER FOR ASPHALT AND CONCRETE PAVEMENTS

Delete "ASTM D 3405" and substitute "ASTM D6690 Type II"

ON PAGE 497, SUBSECTION 706.01- GENERAL REQUIREMENTS FOR CONCRETE PIPE

Delete "cement" from the first sentence.

Add the following:

Effective July 1, 2005, manufacturers furnishing concrete pipe must hold current certification under either the NPCA Plant Certification program or the ACPA Q-Cast Plant Certification program.

ON PAGE 517, SUBSECTION 708.16- RIGID POSTS FOR DELINEATORS, SNOW POLES, AND MILEPOSTS OR KILOMETER POSTS *

Delete the first paragraph and substitute the following:

Finished steel posts for delineators shall weigh a minimum of 1.12 lb./ft. (1.66 kg/m) and shall conform to ASTM A 702, Steel B; they shall be coated with a deep green, baked-on enamel finish.

Delete the second paragraph.

ON PAGE 519, SUBSECTION 708.17- STEEL AND ALUMINUM SIGN SUPPORTS *

Delete the last sentence in the third paragraph and substitute the following sentence:

"Anchor bolts, nuts, and washers shall conform to ASTM F 1554."

Delete the fifth paragraph.

Under the "Steel Structure List" Add "ASTM F 1554 (anchor bolts)"

ON PAGE 520, SUBSECTION 708.17- STEEL AND ALUMINUM SIGN SUPPORTS *

Delete from the first sentence of the second paragraph the word "two" and substitute "three".

ON PAGE 522, SUBSECTION 708.19- ILLUMINATION POLES AND BASES *

Delete from the second sentence of the first paragraph following the table of specifications the word "wind" and substitute "design".

ON PAGE 523, SUBSECTION 708.19- ILLUMINATION POLES AND BASES *

Delete from the fourth and fifth paragraphs "structural and wind" and substitute "design".

ON PAGE 526, SUBSECTION 709.05- WATER REDUCING ADMIXTURES

Add the following:

709.06 Lithium Nitrate Admixtures. Lithium nitrate admixture shall consist of a 30% aqueous lithium nitrate solution. The lithium nitrate admixture used in the concrete shall be the same brand and from the same manufacturer as that reported in the mix design and used in the concrete alkali-silica reaction mitigation testing. Use shall follow all manufacturer's recommendations.

ON PAGE 527, SUBSECTION 710.02- WOOD SIGN POSTS AND SNOW POLES

Delete from the heading and throughout the subsection "and Snow poles".

ON PAGE 530 & 531, SUBSECTION 710.09- PRESERVATIVE TREATMENT *

Delete this subsection and substitute the following:

> **710.09 Preservative Treatment.** All timber and lumber requiring preservative treatment shall be treated in accordance with the American Wood-Preservers' Association (AWPA) standards and specifications. These specifications include the following: storing and curing the timber and lumber, the wood preservatives, the preservative treatment process, documenting the results of the treatment, inspection, testing and the identification of properly treated timber. Unless otherwise specified in the contract, all timber and lumber shall be treated in accordance with Section C-14 of the latest addition of the AWPA standards.
>
> All cutting, boring, chamfering, routing, surfacing, and trimming shall be done prior to treating. Any field drilling or cutoffs shall be treated by two liberal applications of a compatible preservative. The applications shall be in accordance with the requirements of AWPA Standard M-4.
>
> All charges shall consist of pieces of the same species that are similar in form, size, moisture content, and receptivity of treatment. The pieces in the charge shall be separated to ensure contact of treating medium with all surfaces. The method of determining the retention of the preservatives shall be by assay.
>
> The Certificate of Treatment shall include the following information:

Name and location of the wood preserving company
Customer identification
Date of treatment and charge number
Type of chemical used and the amount of retention by assay
Treating process and identification of the specifications used
Description of material that was treated
Signature of a responsible plant official

All timber and lumber to be used in aquatic environments, unless specified otherwise in the contract, shall be chemically treated using Best Management Practices (BMPs). The producer of the chemically treated products shall supply a written certification that the BMPs were utilized, including a description and appropriate documentation of the BMPs used. This information may be included with or on the Certificate of Treatment record.
Sign posts and fence posts shall be pressure treated with Ammoniacal Copper Zinc Arsenate (ACZA), Chromated Copper Arsenate (CCA), Copper Naphthenate or Pentachlorophenol in accordance with the latest version of American Wood Preservers Association Standards (AWPA) P5, P-8, P-9 and C-14, except:

The minimum retention of the preservative in the wood as determined by assay shall be as follows:

	lbs. /ft^3	(kg/m^3)
Ammoniacal Copper Zinc Arsenate (ACZA)	0.40	(6.4)
Chromated Copper Arsenate (CCA)	0.40	(6.4)
Copper Naphthenate	0.060	(0.96)
Pentachlorophenol	0.50	(8.0)

Guardrail post and block spacers shall be pressure treated with Ammoniacal Copper Zinc Arsenate (ACZA), Chromated Copper Arsenate (CCA), Copper Naphthenate or Pentachlorophenol in accordance with the latest version of American Wood Preservers Association Standards (AWPA) P5, P-8, P-9 and C-14, except:

The minimum retention of the preservative in the wood as determined by assay shall be as follows:

	lbs. /ft^3	(kg/m^3)
Ammoniacal Copper Zinc Arsenate (ACZA)	0.50	(8.0)
Chromated Copper Arsenate	0.50	(8.0)
Copper Naphthenate	0.075	(1.2)
Pentachlorophenol	0.60	(9.6)

Treated posts shall be subject to inspection by the Engineer after arrival at the site and no previous inspection at the plant shall bar rejection.

Certified treating reports shall be furnished for all treated timber products to be shipped. Assay reports shall be furnished for a minimum of one out of four charges shipped. One copy of each

treating report and assay report shall be shipped with the posts, and a second copy of each report shall be sent to:

ITD Materials Engineer
PO Box 7129
Boise, ID 83707

The treating plant shall imprint legible symbols in the end of all timber products treated indicating the name of the treating company and the type and year of treatment in accordance with AWPA Standard Ml and M6.

ON PAGE 537, SUBSECTION 711.04- RIPRAP

Delete from the first sentence of the first paragraph: "suitable salvaged concrete, or concrete in sacks".

ON PAGE 551, SUBSECTION 714.01- GENERAL REQUIREMENTS

Delete the second and third sentences of the first paragraph and substitute the following:

When the contract or source approval requires fly ash concrete, Class F shall be used , and the available alkalies in the fly ash (as Na2O)shall not exceed 1.5 percent. In addition Calcium Oxcide (CaO) content shall not exceed 11 percent.

ON PAGE 558, SUBSECTION 718.05- DRAINAGE GEOTEXTILE PROPERTY REQUIREMENTS

Delete the table and substitute the following:

Geotextile Property	Test Method	Minimum Average Roll Values	
		Type I (1)	Type II
Grab Tensile Strength – lb. (N) (In either principal direction)	ASTM D 4632	80 (365)	180 (800)
Grab Elongation (%)	ASTM D 4632	NA	
Puncture Strength – lb. (N)	ASTM D 4833	35 (155)	80 (355)
Apparent Opening Size (AOS) (Std. Sieve)	ASMT D 4751	0.212 mm (#70) Or Finer	
Permittivity (sec-1)	ASMT D 4491	0.7	0.7

ON PAGE 558, SUBSECTION 718.06- RIPRAP/EROSION CONTROL GEOTEXTILE PROPERTY REQUIREMENTS

Delete the table and substitute the following:

Geotextile Property	Test Method	Minimum Average Roll Values	
		Type I (1)	Type II
Grab Tensile Strength – lb. (N) (In either principal direction)	ASTM D 4632	130 (580)	200 (890)
Grab Elongation (%)	ASTM D 4632	15	15
Puncture Strength – lb. (N)	ASTM D 4833	60 (270)	80 (355)
Trapezoidal Tear – lb. (N)	ASTM D 4533	40 (180)	50 (225)

Apparent Opening Size (AOS) (Standard Sieve)	ASTM D 4751	#50 (0.3 mm) or Finer	
Permittivity (sec-1)	ASTM D 4491	0.5	0.5
Ultraviolet (UV) Radiation Stability	ASTM D 4355	70% Strength Retained @150 hrs.	

ON PAGE 559, SUBSECTION 718.07- SUBGRADE SEPARATION GEOTEXTILE PROPERTY REQUIREMENTS

Delete the table and substitute the following:

Geotextile Property	**Test Method**	**Minimum Average Roll Values**	
		Type I	Type II (1)
Grab Tensile Strength – lb (N) (In either principal direction) (2)	ASTM D 4632	180/115 (800/510)	270/180 (1200/800)
Grab Elongation (%) (2)	ASTM D 4632	<50%/≥50%	<50%/≥50%
Puncture Strength – lb (N) (2)	ASTM D 4833	70/40 (310/180)	100/75 (445/335)
Trapezoidal Tear Strength – lb (N)	ASTM D 4533	70/40 (310/180)	100/75 (445/335)
Apparent Opening Size (AOS) (3) (Standard Sieve)	ASTM D 4751 COE CW-002215	#30 (0.60 mm) or Finer	
Permittivity (sec-1) (3)	ASTM D 4491	0.02	0.02

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FOR 2004 IDAHO STANDARD SPECIFICATIONS

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*** Revised from April 2005 Version**

SUPPLEMENTAL SPECIFICATIONS

ON PAGE 3, SUBSECTION 101.01- ABBREVIATIONS

Incorporate the following in alphabetic order:

ACPA American Concrete Pipe Association
NPCA National Precast Concrete Association
PCAA Precast Concrete Association of America *

ON PAGE 4, SUBSECTION 101.02- DEFINITIONS

Delete the last paragraph and substitute the following:

Contract items are numbered to correspond to sections of these specifications. Special provision contract items are numbered beginning with an "S" followed by either a section number to which work is similar, or to a 900 generic series number.

ON PAGE 18, SUBSECTION 104.03- CHANGES AND EXTRA WORK

In the first sentence of Part 4 delete "720" and replace with "seven (7) calendar".

ON PAGE 19, SUBSECTION 104.03- CHANGES AND EXTRA WORK

Delete Part 9, and substitute the following:

9. Prime Contractor's Overhead and Profit: When extra work is performed by an approved first or lower tier subcontractor, or by owner-operator, compensation to the prime Contractor for overhead and profit will be in accordance with the following:

		Prime Contractor's Compensation
To	$10,000	10%
Over	$10,000	$1,000 + 5% of excess over $10,000

Bid items with a price per unit in the original contract, which are included in the extra work, are not eligible for additional overhead and profit. Prime Contractor's overhead and profit will be calculated on the total amount of subcontracted and/or owner-operator work.

Delete the first sentence of Part 10 and substitute the following:

> It is considered that overhead and profit for the subcontractor are included in the agreed price, and no additional compensation, above that provided for the prime Contractor's overhead and profit, will be allowed.

ON PAGE 22 & 23, SUBSECTION 104.06- MAINTENANCE OF PUBLIC HAUL ROADS *

Delete the first sentence of the second paragraph and substitute the following:

Dust nuisance due to the Contactor's hauling operations on public highways, streets and special detours shall be abated in a satisfactory manner by the application of water as directed.

Delete from the last sentence, "205.17"

ON PAGE 25, SUBSECTION 105.01- AUTHORITY OF THE ENGINEER AND SUSPENSION OF WORK

Delete Parts 3, 4, & 5 and substitute the following:

3. Upon receipt, the Engineer will evaluate the Contractor's request. If the Engineer agrees that the cost and/or time required for the performance of the contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the Engineer will make an adjustment and modify the contract in writing accordingly. The Engineer will notify the Contractor of the determination whether or not an adjustment of the contract is warranted.

4. In making the contract adjustment a markup for profit will only be allowed on changed or extra work caused by the delay or suspension. No profit will be allowed on any other delay or suspension costs including, but not limited to, standby costs or extended indirect costs. Payment for changed and extra work will be made in accordance with Subsection 104.03.

5. No contract adjustment will be allowed unless the Contractor has submitted the request for adjustment within the time prescribed.

6. No contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided for or excluded under any other term or condition of this contract.

7. In case of suspension of work the Contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project; provide for normal drainage; protect erodible surfaces by approved erosion and sediment control measures; prevent water pollution and prevent damage by sedimentary deposits; and erect any necessary temporary structures, signs, or other facilities. During such period of suspension of work, the Contractor shall also properly and continuously maintain, in an acceptable growing condition, all living material in newly established plantings, seedings, and soddings furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

ON PAGE 26, SUBSECTION 105.02- PLANS AND WORKING DRAWINGS.

Add the following to the 2nd paragraph:

The Contractor shall furnish the Engineer one set of reproducible 3 mil mylar copies of the approved drawings prior to completion of the project for any item that becomes a permanent part of the completed structure.

ON PAGE 26, SUBSECTION 105.03- CONFORMITY WITH PLANS AND SPECIFICATIONS. *

Add the following to the 2nd paragraph:

A schedule of price adjustments is provided in the ITD Laboratory Operations Manual for certain non-specification material that is allowed to remain in place.

ON PAGE 27, SUBSECTION 105.04- COORDINATION OF PLANS, SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS, AND SPECIAL PROVISIONS.

Add the following to the first partial paragraph.

The details shown in the bid schedule shall govern when in conflict with other project documents.

ON PAGE 31, SUBSECTION 105.11- INSPECTION OF WORK *

Add the following after the first full paragraph:

If, during or prior to construction operations, the Engineer fails to reject defective work or materials, whether from lack of discovery of such defect or for any other reason, such initial failure to reject in no way prevents the later rejection when such defect is discovered, or obligates the Department to final acceptance. The Department is not responsible for losses suffered due to any necessary removals or repairs of such defects.

ON PAGE 34, SUBSECTION 105.17- CLAIMS FOR ADJUSTMENTS AND DISPUTES

Delete from the first sentence of the third full paragraph "6030" and substitute "60".

ON PAGE 40, SUBSECTION 105.17- CLAIMS FOR ADJUSTMENTS AND DISPUTES

Add the following after Part 2.

The Department and Contractor agree that all arbitration panels will be composed of three (3) members.

ON PAGE 43, SUBSECTION 105.18- CLAIM REVIEW BOARD SPECIFICATIONS *

Delete the last sentence and substitute the following:

The CRB may consult technical and legal experts if the need arises under provisions provided for elsewhere in Subsection 105.18. See **Deliberations.**

ON PAGE 45 & 46, SUBSECTION 105.18- CLAIM REVIEW BOARD SPECIFICATIONS *

Delete the paragraph on the bottom of page 45 thru the top of page 46.

Delete the second full paragraph on page 46 beginning with "If more than one CRB…" and substitute the following:

If a replacement CRB member is required for a particular claim hearing, he or she will be selected from among the alternate CRB members using the following process. The Contractor and the Department (the parties) will toss a coin to see who goes first. The parties will then take turns striking names off the alternate list until one name is left. This will be the replacement CRB member for that particular claim hearing.

If a replacement CRB member or alternate is required for the standing board (3-year term), he or she will be selected jointly by the AGC Highway Construction Committee and the Department (the parties) using the following process. The Department will provide to the AGC a copy of the resumes of all persons on the current DRB Pre-Qualified Roster. The parties will each nominate 3 individuals from the Roster and notify the other party. The nominees for CRB member may already be CRB alternates. All the nominees will be combined into one list. The parties will flip a coin to decide who goes first. The parties will then take turns striking names off the list until one name is left. This will be the new CRB member or alternate.

ON PAGE 50, SUBSECTION 105.18- CLAIM REVIEW BOARD SPECIFICATIONS *

Add the following after the paragraph under the heading of Deliberations:

If the CRB desires special services such as legal, technical, or other expert assistance or testimony, or other consultation, accounting, data research, and the like, the CRB will make a request in writing to both parties (Contractor and the Department) briefly defining the scope and estimated budget for the services. If they agree to the request the Contractor and the Department will execute an agreement with a mutually agreeable service provider. The Contractor and the Department will share the costs for the service provider equally. The service provider will bill the Contractor who will pay the full amount of the invoice after approval by both parties. The Contractor will then bill the Department for 50% of the approved invoice amount. The Department will then promptly make payment to the Contractor along with the CRB billings.

In the typical situation the special service provider will respond to the CRB's questions in private consultation between the provider and the CRB and no permanent record of the questions or responses will be required by the Contractor or the Department. However, if mutually agreeable, these typical operating procedures may be modified. In arriving at its findings and recommendations the CRB will not be bound by any information provided by the special service provider.

ON PAGE 54, SUBSECTION 105.18- CLAIM REVIEW BOARD SPECIFICATIONS *

Delete the second paragraph and substitute the following:

If the CRB desires special services such as legal, technical, or other expert assistance or testimony, or other consultation, accounting, data research, and the like, both the Contractor and The Department must agree to provide the special services, and the procedures under the heading, **Deliberations**, will be followed.

ON PAGE 59, SUBSECTION 105.19- TECHNICAL ANALYSIS SUPPORT *

Delete the last sentence of the first paragraph.

Delete the last sentence of the second paragraph and substitute the following:

The TE will bill the Contractor who will pay the full amount of the invoice after approval by both the Contractor and the Department. The Contractor will then bill the Department for 50% of the approved invoice amount. The Department will then promptly make payment to the Contractor.

ON PAGE 64, SUBSECTION 105.20- VALUE ENGINEERING CHANGE PROPOSALS (VECP)

Delete (5) and substitute the following:

(5) If the VECP requires the services of a Professional Engineer as required by Idaho Code, the VECP shall be stamped by a Professional Engineer licensed in the State of Idaho.

ON PAGE 65, SUBSECTION 106.01- SORCE OF SUPPLY AND QUALITY REQUIREMENTS *

Delete from the second sentence of the second paragraph “qualified products list” and substitute: “Qualified Products List (QPL)”.

ON PAGE 66, SUBSECTION 106.03- SAMPLES, TESTS, CITED SPECIFICATIONS

Add after the first paragraph:

Testing performed on the Contractor’s behalf for plant mix designs, alkali-silica reactivity expansion and dispute resolution shall be performed under the direct supervision of a Professional Engineer licensed in

the state where the testing is performed. Test reports shall be stamped by the supervising Professional Engineer licensed in the state where the testing is performed.

Delete the third paragraph and substitute the following: *

Quality assurance will be in accordance with the Department's Quality Assurance Program as contained in the ITD Quality Assurance manual as perscribed in the special provisions, except sampling and test methods.

All sampling and test methods prescribed in the contract, including, but not limited to WAQTC, ASTM, AASHTO, Idaho Test Methods, etc., shall be in accordance with the edition of the test methods in effect on January 1st of each year.

ON PAGE 66, SUBSECTION 106.04- CERTIFICATION OF MATERIALS

Add the following:

Certification shall reference the project and item numbers for which the material is intended.

ON PAGE 68, SUBSECTION 106.08- FIELD LABORATORY

Delete the first sentence of the second full paragraph and substitute the following:

The Contactor shall provide a commercially comparable, 200-ampere 125/250 volt service, single phase, four wire, 60 cycle AC service to the outlet of the field laboratory or field office, unless otherwise approved.

Delete the third, fourth, and fifth full paragraphs and substitute the following:

The Contractor shall provide a service for electrical hook-up. The service shall be equipped with a feeder assembly compatible with the requirements of the current National Electrical Code (NEC). This assembly shall be rated for 200 ampere service, unless otherwise approved.

ON PAGE 71, SUBSECTION 106.09- MATERIAL SOURCES

Add the following:

> The Contractor shall be responsible for construction and maintenance of haul roads from materials sources to the site of the work or to the nearest public road. Maintenance shall include dust abatement.
>
> Discharge of turbid waters which would create pollution shall not be allowed into any streams or other bodies of water.

ON PAGE 71, SUBSECTION 106.10- PREPARATION OF MATERIAL SOURCE

Delete the heading of this subsection and substitute the following:

106.10 Preparation of Department Controlled Material Source.

ON PAGE 71, SUBSECTION 106.11- PRODUCTION OF MATERIAL

Delete from the second sentence of the first paragraph "designated sources," and substitute "department controlled sources,"

ON PAGE 81, SUBSECTION 107.11- CONTRACTOR'S RESPONSIBILITY FOR WORK

Delete the text of this Subsection and substitute the following:

A. General

All work and material for the contract, including any change order work, shall be done and furnished at the sole risk of the Contractor until the entire improvement has been completed and final acceptance granted by the Engineer, except as provided in this subsection.

The Contractor shall rebuild, repair, restore, and make good all damages to any portion of the permanent or temporary work occurring before the final acceptance date and shall bear all the expense to do so, except damage to the permanent work caused by:

1. Acts of God. This is defined as cataclysmic natural phenomena such as tornadoes, earthquakes, floods, and officially declared natural disasters.
2. Acts of the public enemy or governmental authority.

Provided, however, that these exceptions shall not apply should damages result from the Contractor's failure to take reasonable precautions or to exercise sound engineering and construction practices in conducting the work.

If the performance of the work is delayed as a result of damage by others, an extension of contract time will be evaluated in accordance with Subsection 108.06.

B. Relief of Responsibility for Completed Work

The Contractor may be relieved of the duty of maintaining and protecting portions of the work that have been accepted in accordance with Subsection 105.16. If this is the case the Contractor will be relieved of the responsibility for damages to said completed portions of the work resulting from use by the public traffic, or from the action of the elements, or from any other cause, but not from damage resulting from the Contractor's operations or negligence.

C. Relief of Responsibility for Damage by Public Traffic

When it is necessary for public traffic to utilize a highway facility during construction, the Contractor will be relieved of responsibility for damages to the permanent work by public traffic under the following circumstances:

1. The work is in accordance with the contract plans or approved stage construction plans,
2. The work is on a section of roadway required by contract to be opened to public traffic, and
3. The traffic control is in accordance with the approved traffic control plans.

If traffic is relocated to another section of roadway, the Contractor shall resume responsibility for the work until such time as the section of roadway is again open to public traffic or the Contractor submits a written request for work that is completed to a point where relief can be granted in accordance with paragraph B above.

D. Repair of Damage

The Contractor shall promptly repair all damage to either temporary or permanent work as directed by the Engineer. For damage qualifying for relief under Paragraphs A, B and C above, payment will be made using the method(s) deemed appropriate by the Engineer, either: (1) at contract unit prices, (2) in accordance with 104.03, (3) in accordance with 109.03 or, (4) the Engineer may elect to have the repair work done by others or by State forces. Payment will be limited to repair of damaged work

only. No payment will be made for delay or disruption caused by damage to, or repair of, the temporary or permanent work.

ON PAGE 85, SUBSECTION 107.19- FENCING *

Add the following:

When necessary to remove fencing, the fencing shall be replaced by the contractor in equal or better condition than prior to removal.

ON PAGE 106, SUBSECTION 109.03- EXTRA AND FORCE ACCOUNT WORK

Delete from Part 4 a "The Rental Rate Blue Book published by Dataquest, Inc.," and substitute "The Rental Rate Blue Book published by Equipment Watch (A PRIMEDIA Business Directories & Book Group),".

ON PAGE 109 & 110, SUBSECTION 109.03- EXTRA AND FORCE ACCOUNT WORK

Delete Part 8 through the end of this subsection, and Substitute the following:

8. Prime Contractor's Overhead and Profit: When work on a force account basis is performed by an approved first or lower tier subcontractor, or by owner-operator, compensation to the prime Contractor for overhead and profit will be in accordance with the following:

		Prime Contractor's Compensation
To	$10,000	10%
Over	$10,000	$1,000 + 5% of excess over $10,000

Bid items with a price per unit in the original contract, which are included in Force Account work, are not eligible for additional overhead and profit. Prime Contractor's overhead and profit will be calculated on the total amount of subcontracted and/or owner-operator work.

Approval of this additional amount will be made after receipted invoices are furnished by the Contractor.

Force account work shall be adjusted daily upon duplicate report sheets furnished by the Engineer and signed by both parties, which daily reports shall thereafter be considered the true record of the force account work done.

ON PAGE 111, SUBSECTION 109.05- PARTIAL PAYMENTS

Delete the last three paragraphs and substitute the following:

The Contractor shall pay each Subcontractor or supplier for satisfactory performance of its contract no later than 20 calendar days from receipt of each payment the Contractor receives from the Department. The Contractor shall return retainage to each Subcontractor or supplier within 20 calendar days after the subcontractor's or supplier's work is satisfactorily completed.

The Contractor shall certify with each estimate payment that payment to Subcontractors or suppliers has been made within the prescribed time frames. The certification will be made on forms provided by the Department, and returned within 20 calendar days of receiving the estimate payment.

These requirements shall also apply to first or lower tier subcontractors or suppliers.

ON PAGE 114, SUBSECTION 201.03- CONSTRUCTION REQUIREMENTS

Delete the third paragraph and substitute the following:

Disposal of materials shall not be done by open burning.

ON PAGE 126, SUBSECTION 205.03- CONSTRUCTION REQUIREMENTS

Delete the fifth paragraph and substitute the following:

In lieu of Idaho T-74, the standard density of coarse granular material may be determined in accordance with the following standard method:

In the sixth paragraph, delete “ASHTO” and substitute “AASHTO”.

ON PAGE 128, SUBSECTION 205.03- CONSTRUCTION REQUIREMENTS

Delete the portion of the first sentence after the colon and substitute the following:

> For materials having a maximum dry density of 120 lb/CF (1900 kg/m^3) or less, uncorrected before applying AASHTO T 224, 95 percent of standard density and for materials having a maximum dry density greater than 120 lb/CF (1900 kg/m^3), uncorrected before applying AASHTO T 224, 100 percent of standard density.

ON PAGE 139, SUBSECTION 212.02- MATERIALS

Delete pipe subsection reference “708.21” and substitute “706”.

ON PAGE 151, SUBSECTION 212.05- BASIS OF PAYMENT

Delete from the last sentenceof the first paragraph: "SSP-640" and substitute "Section 640".

ON PAGE 151, SUBSECTION 213.02- MATERIALS *

Add the following:

Vegetative matter shall be incorporated into topsoil, except brush, trees, and noxious weeds. Microorganism inoculants shall contain a diverse mix of regional specific mycorrhizal species for specific condition, provide macro- and micronutrients to plants, be tolerant of chemical imbalances in the soil, produce humic compounds and binding compounds, and improve soil structure.

ON PAGE 151, SUBSECTION 213.03- CONSTRUCTION REQUIREMENTS *

Add the following before the 1st sentence of the 1st paragraph:

Topsoil shall be excavated to a depth of at least 6 in (150 mm), unless otherwise directed.

Add the following to the 1st paragraph:

Topsoil stockpiles shall be treated with temporary soil stabilization measures and sediment and erosion control measures immediately upon completion of the stockpile and as required by the contract.

Add the following after the 1st paragraph:

Topsoil stockpiles shall not exceed 4 ft (1.3 m) in height unless otherwise approved. If the stockpile is undisturbed for longer than 3 months, the top 1 ft (0.3 m) shall be mixed with the remainder of the stockpile to ensure that living organisms are distributed throughout at the time of final placement, or microorganism inoculants shall be added to topsoil, after final placement, in accordance with manufacturer recommendations. Microorganism inoculants may be applied as dry granular mixes, tablets, or injectible soluble.

ON PAGE 153, SUBSECTION 301.02- MATERIALS

Delete the last two sentences of the last paragraph.

ON PAGE 154, SUBSECTION 301.03- CONSTRUCTION REQUIREMENTS *

Delete 2nd full paragraph and substitute the following:

Compaction of the subbase shall meet 95% of the maximum dry density unless more than 30% is retained on the 3/4 inch (19 mm) sieve, in which case, density will be achieved with a minimum of 12 complete coverages of a vibratory roller meeting Subsection 306.03.

ON PAGE 156 & 157, SUBSECTION 303.02- MATERIALS *

Delete the second paragraph.

Delete the last sentence and standard test method from the sixth paragraph and substitute the following:

In lieu of Idaho T-74 and when approved, the maximum dry density of aggregate base may be determined in accordance with the following:

Moisture Density Relations of Soils	AASHTO T180, Method D

ON PAGE 164, SUBSECTION 307.01- DESCRIPTION

Delete the text of this subsection and substitute the following:

This work shall consist of furnishing and placing one or more courses of open-graded rock base (rock cap) on a prepared surface in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established.

ON PAGE 165, SUBSECTION 307.03- CONSTRUCTION REQUIREMENTS *

Delete the last two sentences of the first partial paragraph and substitute:

The first layer shall be compacted with a minimum of 6 full coverages of a vibratory roller meeting the requirements of Subsection 306.03-3. Vibratory Rollers. Subsequent layers of open-graded rock base shall be compacted with a minimum of 2 full coverages for each 6 inch lift thickness.

ON PAGES 172 & 173, SUBSECTION 403.03- CONSTRUCTION REQUIREMENTS *

Delete the first paragraph and substitute the following:

Approaches shall be sealed before sealing the adjacent roadway.

Bridge decks and approach slabs shall not be seal coated without approval. All drains and bridge expansion joints shall be protected from the seal coat application, and the material used for this protection

shall be removed and properly disposed of after completion of the seal coat. All asphalt and aggregate which may have spilled into drains and deck expansion joints shall be removed after completion of the seal coat.

Asphalt shall not be spread until the surface to be sealed has been cleaned as required and the section has been approved. Asphalt shall be applied by means of a pressure distributor in a uniform, continuous spread over the section to be treated and within the temperature range specified. The quantity of asphalt to be used per square yard (square meter) shall be as designed and field verified. If the texture of the surface is such that asphalt penetrates too rapidly, a preliminary application of from 0.05 to 0.10 gal/SY (0.25 to 0.5 L/m2) of surface may be required.

Delete the first sentence of the seventh paragraph and substitute the following:

Immediately following the application of asphalt, cover coat material shall be spread in quantities at the designed and field verified rate.

ON PAGE 179, SUBSECTION 405.02- MATERIALS *

Delete the first paragraph and substitute the following:

Reclaimed Asphalt Pavement (RAP) will be allowed in the Job Mix Formula. RAP is defined as salvaged bituminous material that may have minor coatings of dust or aggregate particles with no discernable seams, pockets, or amounts of base or soil. RAP stockpiles shall consist of 100% reclaimed asphaltic material prior to use. All RAP material shall be obtained from state or local roadways.

RAP shall be reduced as needed to pass through the nominal maximum size screen prior to introduction to the mix.

A maximum of 15% RAP per weight of the mix may be included as part of the job mix formula provided the mix meets all other requirements for plantmix. The Contractors mix design shall include the type and amount of recycling agent in the mixture.

Unless otherwise specified, RAP shall not be allowed in the top lift of interstate paving.

ON PAGE 181, SUBSECTION 405.02- MATERIALS *

Delete the fifth test method and substitute the following:

Moisture Content of Hot Mix Asphalt (HMA) by oven method…….AASHTO T 329

Delete “ASTM D4791” and substitute the following:

Idaho Field Operating Procedures (FOP) of the Quality Assurance Manual for ASTM D 4791.

ON PAGE 181, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS *

Delete the second sentence and substitute the following

The Contractor's mix design shall provide the the Job Mix Formula (JMF) for the project using a qualified Laboratory and shall be stamped by a Professional Engineer licensed in the state where the mix design was prepared.

ON PAGE 186, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Move the gradation table below the last sentence of the first paragraph.

ON PAGE 187, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Delete the first sentence of the second paragraph and substitute the following:

> The Contractor shall obtain a minimum of three mix samples from each test section in the presence of the Engineer. Each mix sample shall consist of a minimum of 80 pounds of mix. Each sample shall be placed in Department approved storage containers, properly identified, and immediately submitted to the Engineer. Each 80 pound mix sample will be split by the Engineer at the Department testing laboratory in accordance with WAQTC – TM5, with half tested for acceptance and half retained by the Engineer for dispute resolution, if requested and approved.

Delete the third paragraph and substitute the following: *

The Contractor shall obtain a minimum of four random cold feed aggregate samples and immediately submit them to the Engineer for testing.

ON PAGE 188, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Delete Part 3 and substitute the following:

3. The average AASHTO T30 gradations of three randomly selected mix samples shall meet the requirements of Subsection 405.03F-Mixing for the acceptance test strip. If the test strip consists of one test section, the three mix samples will be used to determine the average AASHTO T30 gradation. If the test strip consists of more than one test section, three mix samples from the test strip will be randomly selected for AASHTO T30 gradation testing. The requirements of 703.05 (sand equivalent, fracture and flat and elongated) and 405.02 (fine aggregate angularity) shall be met based on the average tests results of the three cold feed aggregate samples.

   The fourth cold feed aggregate sample will be tested for bulk specific gravity. *

   The bulk specific gravity of the combined aggregate (Gsb) and the bulk specific gravity of the compacted mixture (Gmb) from the test strip materials will be used in the calculation of plant mix properties.

ON PAGE 191, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Add the following to the first partial paragraph:

> The maximum specific gravity value will be determined in accordance with the procedure in Idaho T-125, Acceptance Test Strip for Plant Mix Pavement.

ON PAGE 193, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS *

Add after the second paragraph:

When sampling from truck transports, the Contractor shall provide an adequate platform at the mixing plant to enable samples to be obtained in accordance with WAQTC FOP for AASHTO T 168.

ON PAGE 194, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS *

Delete the sixth full paragraph and substitute the following:

Quality control testing may be used for acceptance provided the quality control testing is verified and is reported as IRI.

ON PAGE 208, SUBSECTION 408.03- CONSTRUCTION REQUIREMENTS *

Add the following after the fourth paragraph of Part B:

Fog coat shall be applied in the same diretion as traffic travels upon the roadway.

ON PAGE 215, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS

Add the following to the third full paragraph:

> Testing may be performed on the coarse and fine aggregates together or separately. If testing is performed on the coarse and fine aggregates together the blend percentage must be reported on the test and be within plus or minus 2 percent of the blend percentage used in the mix design. When tested separetely, mitigation shall be based on the aggregate requiring the most mitigation.

Add the following after the sixth full paragraph: *

> Fly ash, if used in the concrete mix for ASR mitigation, shall not have a CaO content more than 2 percent above the CaO content of the fly ash used for AASHTO T303 testing. If the fly ash has a CaO content greater than 2 percent above the fly ash used for testing, additional AASHTO T303 at the higher CaO content shall be required.
>
> If fly ash is used only as a mineral admixture, the dosage of lithium nitrate shall be calculated based on AASHTO T303 testing without fly ash.

ON PAGE 222, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS

Delete Part 10 and substitute the following:

10. The Contractor shall furnish concrete that will have a temperature of at least 50 F (10 C) and not more than 85 F (29 C) at the time of placing.

Delete the first sentence of Part F and substitute the following:

F. Temperature Limitations and cutoff Dates. Concrete pavement may be placed between May 1 and October 1 with the following precautions: When concreting is authorized during cold weather, the temperature of the mixed concrete shall be not less than 50 F (10 C) and not more than 85 F (29 C) at the time of placing.

Delete the first sentence of the second paragraph of Part F and substitute the following:

> The temperature of the concrete shall not exceed 85 F (29 C) at time of placement.

ON PAGE 240, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS *

Delete the text of Part Q and substitute the following:

Full use of the pavement by all classes of traffic will not be permitted until field cured test specimens have attained a compressive strength of not less than 3500 psi (24 MPa). The pavement shall be cleaned before opening to traffic.

ON PAGE 244, SUBSECTION 411.02- MATERIALS

Add “409.01 and” in the first paragraph after the word “Subsection”.

ON PAGE 244, SUBSECTION 411.03- CONSTRUCTION REQUIREMENTS

Add “409.01 and” in the first paragraph after the word “Subsection”.

ON PAGE 249, SUBSECTION 411.03- CONSTRUCTION REQUIREMENTS *

Add the following to Part H.4:

5. Tie bars. Tie bars shall conform with Subsection 409.03 3. Tie Bars.
6. Load Transfer Devices. Load transfer devices shall conform with Subsection 409.03 4. Load Transfer Devices.

ON PAGE 251, SUBSECTION 411.03- CONSTRUCTION REQUIREMENTS

Delete the first paragraph and substitute the following:

O. *Opening Pavement to Traffic*. Full use of the pavement by all classes of traffic will not be permitted until field cured test specimens have attained a compressive strength of not less than 3500 psi (24 MPa).

ON PAGE 253, SUBSECTION 412.02- MATERIALS

Add the following at the beginning of the third paragraph:

All plant mix seal designs shall use a minimum on one-half percent (1/2%) approved anti-stripping additive by weight of asphalt.

ON PAGE 254, SUBSECTION 412.03- CONSTRUCTION REQUIREMENTS

Delete in Part E the words "Part E" and substitute "Part A".

Delete in Part G the words "Part H" and substitute "Part I".

Delete in Part H the words "Part I" and substitute "Part B".

Delete in Part I the words "Part J" and substitute "Part K".

ON PAGE 257, SUBSECTION 501.02- MATERIALS *

Delete the text of this subsection and substitute the following:

Not specified.

ON PAGE 262, SUBSECTION 502.01- DESCRIPTION

Add the following to Part A:

Except when used in structural foundation and bridge applications, Class 22 (15.0), class 15 (10.5) and Seal Concrete do not require AASHTO T 303 mitigation testing as part of the mix design and do not require the use of ASR mitigation measures.

ON PAGE 265, SUBSECTION 502.01- DESCRIPTION *

Delete the last sentence and substitute the following:

Manufacturers furnishing precast concrete products shall hold current certification under the NPCA Plant Certification Program or PCAA Plant Certification Program. Subcontractors holding current PCI plant certification per Section 506 are exempt from NPCA or PCAA plant certification requirements.

ON PAGE 267, SUBSECTION 502.02- MATERIALS

Add after the second test method “WAQTC TM-2”:

When concrete is delivered by means of a concrete pump, samples shall be obtained at the final point of placement (discharge pipe).

The Contractor shall provide a safe and accessible platform for sampling the fresh concrete in close proximity and elevation to the final point of placement.

ON PAGE 268, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete the last partial paragraph.

ON PAGE 269, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete the first partial paragraph and substitute the following after the table.

Laboratory specimens, produced in accordance with AASHTO T 303, shall be required using the cement, fly ash, and other mitigative additives proposed for use in the mix design. Expansion of mortar bars shall not exceed 0.10 percent with the addition of fly ash, lithium, or other additives. Testing may be performed on the coarse and fine aggregates together or separately. If testing is performed on the coarse and fine aggregates together the blend percentage must be reported on the test and be within plus or minus 2 percent of the blend percentage used in the mix design. When tested separetely, mitigation shall be based on the aggregate requiring the most mitigation.

Add the following after the second full paragraph: *

Fly ash, if used in the concrete mix for ASR mitigation, shall not have a CaO content more than 2 percent above the CaO content of the fly ash used for AASHTO T303 testing. If the fly ash has a CaO content greater than 2 percent above the fly ash used for testing, additional AASHTO T303 at the higher CaO content shall be required.

If fly ash is used only as a mineral admixture, the dosage of lithium nitrate shall be calculated based on AASHTO T303 testing without fly ash.

ON PAGE 275, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete from the last sentence of the first Paragraph of Part 1 "an Engineer registered in the State of Idaho" and substitute "a Professional Engineer licensed in the State of Idaho".

ON PAGE 277, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Add the following after Part 3a.

(5) Falsework and Forms Supporting Concrete Work on Steel Structures.

a. Loading of Girder Webs: Falsework and forms supporting the concrete work on steel structures shall be constructed so that any loads applied to girder webs shall be applied within 6” (150mm) of a flange or stiffener and shall be distributed in a manner that will not produce local distortion of the web.

b. Lateral Loading of Girder Flanges: Temporary struts and ties shall be provided as necessary to resist lateral loads applied to the girder flanges and to prevent appreciable relative vertical movement (0.2” (5mm) maximum) between the edge of deck form and the adjacent steel girder.

(6) Add the following procedure for determining the lateral pressure of fluid concrete when pozzolans or admixtures are used in the concrete mix:

For concrete made with pozzolans or admixtures and placed with normal internal vibration to a depth of 4 ft. or less, formwork can be designed for a lateral pressure as follows:

p = lateral pressure, psf
R = rate of placement, ft./hr.
T = temperature of concrete during placing, deg F
Cc = chemistry coefficient;
1.2 for cement type I and III with a retarder*
1.2 for blends containing fly ash without a retarder*
1.4 for blends containing fly ash with a retarder*

* retarders include any admixture that delays setting of concrete

For columns:

$$p = Cc [150 + 9000 R / T]$$

with a maximum of (3000)(Cc) psf, a minimum of 600 psf, but in no case greater than wh.

For walls:

$$p = Cc [150 + 43,400 / T + 2800 R / T]$$

with a maximum of (2000)(Cc) psf, a minimum of 600 psf, but in no case greater than wh.

For the purpose of applying the pressure formulas, columns are defined as elements with no plan dimension exceeding 6.5 feet. Walls are defined as vertical elements with at least one plan dimension greater than 6.5 feet.

**This specification is a modification of ACI Manual of Concrete Practice Part 4, 2004 Subsection 2.2.2, Lateral pressure of concrete.

ON PAGE 285, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete from the Table, Part 2b and substitute the following:

b. Approach slabs, and bottom slabs of box girders (with falsework in place).

ON PAGE 296, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete "approach slabs" from the second paragraph of Part A. Water Cure.

ON PAGE 310, SUBSECTION 504.01- DESCRIPTION

Delete the first sentence of Part H and substitute the following:

The Contractor shall submit the proposed plan for erection to the Engineer for approval.

Delete the next to last sentence of the second paragraph of Part H and substitute the following:

The calculation and plan shall be stamped by a Professional Engineer licensed in the State of Idaho.

Delete the third full paragraph.

ON PAGE 338, SUBSECTION 505.03- CONSTRUCTION REQUIREMENTS

Add the following after the first sentence of the second paragraph:

The Contractor shall notify the Engineer a minimum of seven (7) calendar days prior to driving each test pile. The Engineer will require two (2) working days after each test pile is driven to evaluate each test pile result and determine the required pile length.

ON PAGE 380, SUBSECTION 512.01- DESCRIPTION

Delete from the second sentence of Part A “registered” and substitute "licensed".

ON PAGE 398, SUBSECTION 610.03- CONSTRUCTION REQUIREMENTS

Delete the first, third, fifth, and seventh paragraphs.

ON PAGE 399, SUBSECTION 610.03- CONSTRUCTION REQUIREMENTS

Delete last two paragraphs.

ON PAGE 399, SUBSECTION 610.05- BASIS OF PAYMENT

Add the following:

When barbarm/security attachment for Type 4 fence is called for on the plans, no separate payment will be made and all work associated with attachments shall be incidental to the cost of the fence.

ON PAGE 401, SUBSECTION 612.02- MATERIALS *

Delete the material requirement for Posts…710.03 and substitute the following:

Wood Guardrail Posts and Wood Spacer Blocks ……710.03
Steel Guardrail Posts……708.07

ON PAGE 406, SUBSECTION 615.03- CONSTRUCTION REQUIREMENTS *

Delete from the second paragraph “9.84 ft. (3 m)”, substitute “10 ft. (3 m)”.

Delete from the second paragraph “3.28 ft. (1 m)”, substitute “3 ft. (1 m)”.

ON PAGE 407, SUBSECTION 615.03- CONSTRUCTION REQUIREMENTS *

Delete from the first sentence of the third paragraph of part 2 “(3 m)” and substitute “(2.7 m)”.

Delete from the last sentence of the third paragraph of part 2 “590.55 ft.” and substitute “600 ft.”

ON PAGE 411, SUBSECTION 616.03- CONSTRUCTION REQUIREMENTS

Add the following after the first sentence: *

The design parameters for signs shall conform to the following requirements:

Overhead Sign Bridges
- Design Life – 50 years
- Design Wind Speed – 90 mph
- Fatigue Category – (not required)

Overhead Cantilever Sign Structures
- Design Life – 50 years
- Design Wind Speed – 90 mph
- Fatigue Category – I (Fatigue design shall include natural wind gust; periodic galloping forces; and truck- induced gust loads based on a truck speed of 65 mph.)

All other Sign Supports
- Design Life – 25 years
- Design Wind Speed – 90 mph
- Fatigue Category – (not required)

Delete from the second sentence of the first Paragraph "an Engineer registered in the state of Idaho" and substitute "a Professional Engineer licensed in the State of Idaho".

Add "Professional" in the last sentence of the first paragraph after "said ".

ON PAGE 412, SUBSECTION 616.03- CONSTRUCTION REQUIREMENTS

Add to the second full paragraph, “if approved”.

Delete the last sentence of the third full paragraph.

Add after the fifth full paragraph:

Anchors bolts shall be installed plumb plus or minus one degree. The double nuts shall be installed individually and tightened snug tight. “Snug tight” means either the tightness reached by (1) a few blows from an impact wrench, or (2) the full effort of a man using a spud wrench. At least three threads of the anchor bolt shall be visible above the second nut.

High strength structural bolts shall be tightened in accordance with Subsection 504.03.L.2

ON PAGE 421, SUBSECTION 619.03- CONSTRUCTION REQUIREMENTS

Add after the 10th paragraph:

Anchor base assemblies shall have double nuts and be individually tightened snug tight. "Snug tight" means either the tightness reached by (1) a few blows from an impact wrench, or (2) the full effort of a man using a spud wrench. At least three threads of the anchor bolt shall be visible above the second nut.

ON PAGE 422, SUBSECTION 619.03- CONSTRUCTION REQUIREMENTS

Delete the first and second sentences in the first paragraph and substitute the following:

The support coupling device installation shall be in accordance with manufacturer recommendations.

ON PAGE 423-425, SUBSECTION 620.03- CONSTRUCTION REQUIREMENTS *

Delete this subsection and substitute the following:

620.03 Construction Requirements. The Contractor is responsible for adequate and proper care of all plant material. Adequate and proper care includes but is not limited to keeping all plant materials in a healthy, growing condition by appropriate handling, storing, watering, cultivating, pruning and spraying.

Unless otherwise approved, planting operations shall be performed between September 15 and May 15, and shall take advantage of favorable planting conditions. Bare root plants shall be planted before the leaves open or new needles have started forming. If the Contractor is permitted to plant at other seasons, approved organic wetting agents or anti-transpirants shall be applied in accordance with manufacturer recommendations. No wetting agents or anti transpirants shall be applied after April 15.

All soil, discarded branches, rejected plants or other debris, twine, rope, transit guards, or wrappings shall be promptly cleaned up and disposed of.

Irrigated or sodded area(s) to be planted shall be graded and/or leveled prior to staking or marking planting locations. Natural or unmaintained area(s) shall be disked or left in a roughened condition prior to staking planting locations. Tree locations and the general layouts of planting areas for shrubs, vines, and ground cover shall be marked out and staked by the Contractor. Planting shall not begin until the area(s), tree locations and general layouts of the planting site(s) have been approved.

Planting areas for shrubs and vines shall be cultivated to a minimum depth of 4 in. (100 mm). Weeds and other vegetative growth, large clods, rocks, and other debris encountered in the cultivating work shall be removed and disposed of.

When excavating holes for planting, topsoil shall be kept separate from subsoil and shall be made loose and friable. Soils containing a pH greater than 8, a pH less than 4, gravel, stones, or other detrimental material encountered in the excavation shall be removed and disposed of. A soil auger may be used as approved by the Engineer. Excavated planting holes that are left open when the work is not in progress shall be adequately barricaded with appropriate warning devices. Glazed surfaces inside planting holes shall be sufficiently roughened prior to backfilling.

For containerized plants, soil conditioner shall be mixed into 6 in. (150 mm) of loose topsoil in the bottom of planting holes, but shall not be mixed with the soil to be used in backfilling. The quantities to be used will be approximately 1 CF (0.03 m^3) per tree, and 0.5 CF (0.015 m^3) per shrub or vine or as directed.

Plants shall be removed from plastic, metal, or biodegradable containers prior to planting. Care shall be taken to prevent disturbance of the root systems or earth therein. Bare-root plants shall have their roots spread out in a natural position, free of bunching kinking or circling

All holes and cavities between plantings and the surrounding soil shall be filled. In their final position, the plants shall be planted to the root collar depth, or when applicable at the same depth to the finished grade as when growing in the nursery or container. Planting areas shall be finish-graded to conform to drawings after the soil has settled. After planting is completed, the soil surface shall be cultivated to a depth of not less than 2 in. (50 mm).

Commercial fertilizer shall be incorporated uniformly in the surface of the soil around trees and shrubs in the amounts directed. The quantities to be used will be approximately 1 lb. (0.5 kg) per tree, and 0.5 lb. (0.25 kg) per shrub or vine or in amounts as directed.

Mulching of planted areas shall be performed after all planting work in each area is complete and the ground is smooth and clean. Mulch shall be placed with a 3-4 inch (75-100 mm) layer of wood chips or small bark over the entire shrub and vine root system and around trees immediately after planting as shown on the plans.

Mulch shall be removed from plants, structures, roadway areas and grassed areas not specified to be covered.

Select topsoil shall meet the requirements of Subsection 711.09; shall be made loose and friable; and shall be applied in accordance with the plans or as directed.

Trees, shrubs, vines and ground cover shall be thoroughly watered during or immediately after planting. Watering shall be repeated as often as necessary until the work is accepted. The Contractor shall exercise care to prevent puddled soil conditions and avoid compaction around the plants after watering.

Water may be obtained without charge from state-owned or state-controlled water supply systems on the project, if such exist; otherwise water shall be obtained by the Contractor at no expense to the state.

All trees and shrubs shall be pruned at the time of planting to remove broken or damaged twigs, branches or roots and such a manner as to retain or to encourage natural growth characteristics to the plants. Cut surfaces 1 in. (25 mm) or more in diameter shall be painted immediately with an approved tree wound dressing.

The Contractor shall assure the establishment of plantings by watering, cultivating, replacement of plants or mulch, and other work necessary to maintain the plants in a healthy condition, throughout the plant establishment period of one year or as designated in the special provisions.

If the Contractor elects to use a herbicide to control weeds, it shall be the Contractor's responsibility to replace and maintain plants and lawn damaged by its use.

At completion of the original planting, the Engineer shall perform an inspection with the Contractor of all plant material to note and correct any discrepancies. Dead plants shall be removed and replaced. Plants which do not show expected growth, but which retain green leaves, stems, or buds may be left in place, subject to acceptance or rejection during the plant establishment period.

After the original planting the Engineer will periodically inspect the condition of plants and planting areas. The Engineer will notify the Contractor of apparent defects, faults and conditions, and dead plants discovered by the inspection. Correction of apparent defects, faults and conditions, and the removal and disposal of dead plants shall be completed within 10 days after notification or as directed.

If immediate replacement of dead or rejected plants is impossible due to seasonal conditions or the lack of specified plants, a marker shall be placed at the spot of replacement and replacement shall be made in the next planting season. A plant establishment period of six months shall apply to replacement plants. The Contractor shall assure the establishment of the new plantings in accordance with all applicable contract requirements.

In the event of infestation by insects or disease, plants shall be treated by effective remedial measures approved as good horticultural practice.

ON PAGE 427, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS *

Delete the 4th full paragraph – "If seeding is the only remaining work……"

Add the following to the 1st paragraph of part B:

All chemicals for treating weeds shall be applied in accordance with manufacturer recommendations. Chemicals for treating weeds shall be applied at least one month prior to seeding.

ON PAGE 428, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS *

Delete the 2nd sentence of the 2nd full paragraph and substitute the following:

If conditions occur that prevent seeding at specified furrow depths, or if the roughened condition is destroyed, the Contractor shall prepare the seedbed again"

Delete the 3rd and 4th sentences of the 2nd paragraph of Part C: "Fertilizer shall be certified…..".

Add the following to the 1st paragraph of part D:

All native/shrub and/or forb species shall be applied separately from grass species. If seed is applied using broadcast seeding, the soil shall be raked prior to applying seed and/or mulch mixture.

Delete the 1st and 2nd sentences of the 2nd paragraph of part D.

ON PAGE 429, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS *

Delete the 1st full paragraph and substitute the following:

When drill seeding, without using mulch, place seed at the bottom of approximately 1 in. (25 mm) depth furrows (furrows set according to size and dimension of seed) shaped by the double disc openers. Drill rows shall be set to a depth of 1 in (25 mm) or less according to size and dimension of seed. The speed and spring pressure of the drills shall be regulated so ½ in. (12 mm) of soil covers the seed and the furrows are left open. Drag chains will not be allowed.

For drill seeding applications, soil conditioner shall be applied prior to seeding and lightly incorporated into the soil wherever possible.

Delete the 2nd and 5th sentences of the 2nd full paragraph and substitute the following:

Seeding applications shall not be performed when wind interferes with seed placement. Native seeds in the mix shall be broadcast immediately ahead of the drill or be seeded separately.

ON PAGE 430, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS *

Delete the 2nd and 3rd sentences of Part 1 Mulching and substitute the following:

Hydro-mulch applications shall not be used on slopes flatter than 3:1 or in conjunction with drill seeding applications.

ON PAGE 431, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS *

Page 431: Delete the 1st paragraph of Part 3 Erosion Blanket.

ON PAGE 433, SUBSECTION 622.02- MATERIALS

Delete the text of this subsection and substitute the following:

Materials shall meet the requirements of Section 502-Concrete and the plans.

ON PAGE 435-437, SECTION 624 - RIPRAP *

Delete the text of this Section and substitute the following:

624.01 Description. The work for slope protection shall consist of furnishing and placing riprap protection of the type specified at the locations and in reasonably close conformity with the lines and dimensions shown on the plans or as established.

Riprap will be classified as loose riprap, hand placed riprap.

624.02 Materials. Material for riprap shall meet the requirements of the following Subsections:

Loose Riprap.....703 and 711.04

Hand Placed Riprap .....703 and 711.04

624.03 Construction Requirements. The toe trench for riprap shall be excavated below probable scour elevation or to the elevation shown on the plans. Where scour elevation cannot be determined and no elevation is shown on the plans, the trench shall be excavated 2 ft. (600 mm) below channel grade. No stone shall be laid or concrete placed until the toe trench and slopes are approved.

A. *Loose Riprap.* Loose riprap shall be placed so the larger stones are in contact with each other and the voids filled with the finer materials, producing a well graded compact mass. The stone shall be placed on the slope in a manner to ensure the specified thickness in one operation. When placing, care shall be used to avoid disturbing underlying material. Placing in layers parallel to the slope shall not be permitted.

B. *Hand Placed Riprap.* The stones shall be laid by hand on prepared slopes to the thickness specified or directed. The riprap shall be started by placing a course of the largest stones in the toe trench. Each stone shall be so placed that it shall rest partly on the prepared slope and not completely on the stone below and shall be thoroughly tamped or driven into place. The exposed face of all hand placed riprap shall be made as smooth as the shape and size of the stones will permit, and shall not vary more than 3 in. (75 mm) from a plane surface on the required slope.

624.04 Method of Measurement. Loose riprap or hand placed riprap will be measured by the Ton or CY (metric ton or cubic meter) of riprap.

Excavation of toe trenches below the level of the intersection of the slope to be riprapped and the adjacent final ground or channel floor shall be classified, measured and paid for as "structural excavation," in accordance with Section 210 - Structure Excavation and Compacting Backfill. All preparation of the slope to receive riprap above the level of the above described intersection shall be included in the contract price for the class of riprap to be placed.

624.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Loose Riprap	Ton or CY (t or m^3)
Hand Placed Riprap	Ton or CY (t or m^3)

ON PAGE 438, SUBSECTION 625.02- MATERIALS

Add the following:

SiIicone Sealant……704.05

ON PAGE 438, SUBSECTION 625.03- CONSTRUCTION REQUIREMENTS

Add the following after the second paragraph:

Silicone Sealant shall be applied in accordance with the manufacturer's recommendations.

ON PAGE 439, SUBSECTION 626.02- MATERIALS

Delete the first sentence of the third paragraph and substitute the following:

"Pavement marking tape shall be 4 in. (100mm) wide retroreflective pressure sensitive tape manufactured for use as pavement markings suitable for use on either concrete or asphalt surfaces.

Delete from the fourth sentence of the third paragraph the words "striping materials" and substitute "pavement marking tape".

Delete from the first sentence of the fourth paragraph the words "striping material" and substitute "pavement marking tape".

ON PAGE 440, SUBSECTION 626.02- MATERIALS

Add the following after the first partial paragraph:

Temporary rigid raised pavement markers, non-snow-plowable, shall be suitable for use on either concrete or asphalt surfaces as required and shall be made of high impact durable material that will not deflect or deform under tire impacts. Markers shall be yellow for two-way centerline applications and shall have a bi-direction retro-reflective configuration. Markers shall be either yellow or white as required for edge line applications and shall have a mono-directional retro-reflective configuration. Markers shall be white for one-way lane separation applications and shall have a bi-directional retro-reflective configuration. Markers shall not have studs or mechanical attachments. Markers shall be a nominal 4-inch (100 mm) outside dimension, with a minimum installed height of 0.75-inch (18 mm), as shown on the plans or as directed. The reflective surface area shall be a minimum of one inch square (625 mm^2). The specific intensity (SI) (candlepower/foot-candle) for each white retro-reflective surface

at 0.2° observation angle shall be not less than the following when the incident light is parallel to the base of the marker in accordance with ASTM D 4280:

Horizontal Entrance Angle	S I
0 degrees	3.0
20 degrees	1.5

The specific intensity for each yellow marker surface shall be 60% of the value for white.

ON PAGE 441, SUBSECTION 626.03- CONSTRUCTION REQUIREMENTS *

Delete the second full paragraph and substitute the following:

The Contractor shall, unless otherwise specified in the plans, be responsible for taking appropriate preventative measures and supplying and installing all supplemental devices necessary to ensure that all traffic control devices remain in place and serviceable during the period of time in which their use is required. This requirement shall include, but not be limited to providing supplemental devices to ensure that portable sign stands, barricades, drums, tubular markers, and cones are not displaced from their intended use.

ON PAGE 442, SUBSECTION 626.03- CONSTRUCTION REQUIREMENTS

Add the following:

All temporary rigid raised pavement markers, non-snow-plowable, used as a supplement to pavement markings and placed in conjunction with tubular markers to temporarily mark lane separation lines between bi-directional traffic shall be placed as shown on the plans or as directed. Markers shall be fastened to the pavement by adhesion according to the manufacturer's recommendations so they will remain firm. Nailing will not be a satisfactory means of fastening markers to the pavement. Markers shall be protected from traffic until the adhesive has properly cured.

The Contractor shall visually inspect all installed markers at least twice daily and shall replace any lost, damaged or displaced markers that day. Markers shall be removable from asphalt and concrete pavements, either manually or by mechanical devices, without the use of heat, grinding or blasting.

ON PAGE 443, SUBSECTION 626.04- METHOD OF MEASUREMENT

Add the following after the second full paragraph: *

The hours for Traffic Control Maintenance work shall be documented daily upon duplicate report sheets furnished by the Engineer. These reports will be agreed upon weekly and signed by both parties.

Add the following:

Temporary rigid raised pavement markers, non-snow-plowable, will be measure by each installed, complete in place.

ON PAGE 444, SUBSECTION 626.05- BASIS OF PAYMENT

Add the following Pay Item:

Temporary Rigid Raised Pavement Marker, Non-Snow-Plowable……..Each

ON PAGE 453, SUBSECTION 630.04- METHOD OF MEASUREMENT *

Add the following:

The hours for Flagging and Pilot Car Operation work shall be documented daily upon duplicate report sheets furnished by the Engineer. These reports will be agreed upon weekly and signed by both parties.

ON PAGE 458, SUBSECTION 634.02 – MATERIALS

Add the following:

The Type 1-A Mailbox Support - 4x4 Wooden Post shall conform to the requirements of Subsection 710.02 Wood Sign Posts and Snow Poles.

ON PAGE 466, SUBSECTION 656.02- MATERIALS *

Add the following:

Nonstandard poles shall be designed in conformance with the following design parameters in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals:

Design Life – 50 years
Design Wind Speed – 90 mph
Fatigue Category – I (Fatigue design shall include natural wind gust; periodic galloping forces; and truck- induced gust loads based on a truck speed of 65 mph.)

ON PAGE 467, SUBSECTION 656.02- MATERIALS

Delete the second sentence of the fifth paragraph and substitute the following:

Each bolt shall be fitted with three nuts and two washers.

Delete from the second Part 1 "(300 m)" and substitute "(300 mm)".

Delete Part 7 and substitute the following:

7. Lamps shall be 130 volt, clear traffic signal lamps or approved L.E.D. module, with lumen rating and light center as specified by the Institute of Transportation Engineers.

Delete from Part 8 "(300 m)" and substitute "(300 mm)".

ON PAGE 468, SUBSECTION 656.02- MATERIALS

Delete the first paragraph and substitute "Pedestrian signal heads shall be one-way illuminated by incandescent traffic signal lamp contained in each section, or by L.E.D. module with the addition of the following:"

Delete from Part 6 "125 volt" and substitute "120 volt".

Delete the text of Part 7 after the word "furnished".

ON PAGE 474, SUBSECTION 701.01- GENERAL REQUIREMENTS *

Add the following:

Limestone additions of up to 5.0% by mass of the cement shall be allowed providing that the chemical and physical requirements of the finished cement meet the specifications of AASHTO M85. The limestone shall be naturally occurring, consisting of at least 70% by mass of one or more of the mineral forms of calcium carbonate. The manufacturers Mill Test Report shall include the CaCO3 content of the limestone; the CO2 content and calculated limestone content of the cement. The limestone content in Portland Cement shall be derived as determined in ASTM C150 and tested by ASTM C114.

ON PAGE 476, SUBSECTION 702.03- EMULSIFIED ASPHALTS *

Delete the third, fourth and fifth paragraphs and substitute the following:

Cationic emulsified asphalt shall meet the requirements of AASHTO M 208.

All grades of Rapid Setting Emulsion shall be homogenous after thorough mixing within 15 days after delivery.

Polymer Modified Cationic Emulsified Asphalts (CRS-2R and CRS-2L) shall be emulsified blend of asphalt, polymer, water, and emulsifiers.

CRS-2L emulsified asphalt shall meet the requirements of AASHTO M 316.

CRS-2R emulsified asphalt shall include asphalt cement thoroughly blended with a minimum of 1.5 percent total rubber solids. The emulsified asphalt shall conform to the following requirements:

ON PAGE 478 & 479, SUBSECTION 702.08- ASPHALT CERTIFICATION *

Add to the first sentence “on a yearly basis”.

Delete the second paragraph and substitute the following:

The supplier shall perform at least one complete set of quality control tests for each storage tank of polymerized product produced. Bulk tanks of non-polymerized binder shall be tested at least once every 21 calender days. A copy of each Certificate of Analysis (COA) shall be furnished to the Engineer.

ON PAGE 479, SUBSECTION 703.01- GENERAL REQUIREMENTS

Add to the first paragraph:

Values specified for the percent passing the #200 sieve shall have a “.0” added. (i.e. “3-9” shall be “3.0 - 9.0”)

ON PAGE 481, SUBSECTION 703.02- FINE AGGREGATE FOR CONCRETE

Delete the second full paragraph and substitute the following:

The contractor shall perform AASHTO T 303, ASTM C1293 or ASTM C295 testing to determine the potential Alkali Silica Reactivity of the aggregates. Aggregates found to be potentially reactive per AASHTO T 303, ASTM C1293, or ASTM C295 shall require mitigating measures. Aggregates with expansion greater than 0.10 percent as determined by AASHTO T 303, or greater than 0.04 percent as determined by ASTM C1293 will be considered potentially reactive. If ASTM C295 shows an aggregate

composition containing greater than the indicated percentage for any of the following materials, the aggregate will be considered potentially reactive.

Mineral	Limit
Optically strained, microfractured, or microcrystalline quartz	5.0% (max)
Chert or chalcedony	3.0% (max)
Tridymite or cristobalite	1.0% (max)
Opal	0.5% (max)
Natural volcanic glass	3.0% (max)

ON PAGE 482, SUBSECTION 703.03- COARSE AGGREGATE FOR CONCRETE

Delete the sixth full paragraph and substitute the following:

The contractor shall perform AASHTO T 303, ASTM C1293 or ASTM C295 testing to determine the potential Alkali Silica Reactivity of the aggregates. Aggregates found to be potentially reactive per AASHTO T 303, ASTM C1293, or ASTM C295 shall require mitigating measures. Aggregates with expansions greater than 0.10 percent as determined by AASHTO T 303 or greater than 0.04 percent as determined by ASTM C1293 will be considered potentially reactive. If ASTM C295 shows an aggregate composition containing greater than the indicated percentage for any of the following materials, the aggregate will be considered potentially reactive.

Mineral	Limit
Optically strained, microfractured, or microcrystalline quartz	5.0% (max)
Chert or chalcedony	3.0% (max)
Tridymite or cristobalite	1.0% (max)
Opal	0.5% (max)
Natural volcanic glass	3.0% (max)

ON PAGE 483, SUBSECTION 703.04- AGGREGATE FOR UNTREATED BASE, TREATED BASE AND ROAD MIX *

Delete the Percent Passing the No. 30 Sieve Size for 3/4 in. A, and substitute “8-30”.

Add at the end of table:

The “B” gradation shall be used unless otherwise specified.

ON PAGE 483, SUBSECTION 703.05- AGGREGATE FOR PLANT MIX PAVEMENT *

Add in the second sentence after "mix meets all" the words "other Class III requirements. Aggregate shall be crushed stone or".

ON PAGE 483, SUBSECTION 703.05- AGGREGATE FOR PLANT MIX PAVEMENT *

Delete from the last sentence of the fourth paragraph “weight in the course aggregate." and substitute "mass, on any individual coarse aggregate sieve."

ON PAGE 489, SUBSECTION 703.06- AGGREGATE FOR COVER COAT MATERIAL

Delete the table and subsequent paragraph and substitute the following:

Gradation Table

Sieve Size	Class A Urban	Class B Rural
	Percent Passing	
½ inch (12.5 mm)	100	100
3/8 inch (9.5 mm)	95 - 100	40 - 70
No. 4 (4.75 mm)	0 - 6	0 - 6
No. 8 (2.36 mm)	0 - 3	0 - 3
No. 200 (0.075 mm)	0 - 2.0	0 - 2.0

The aggregate for urban and rural cover coat material shall have a cleanness value of not less than 80.

ON PAGE 490, SUBSECTION 703.08- AGGREGATE FOR OPEN GRADED ROCK BASE (ROCK CAP)

Delete the last sentence and substitute the following:

The minimum sample size tested shall be 65 lb (30 kg).

ON PAGE 491, SUBSECTION 703.11- AGGREGATE FOR GRANULAR SUBBASE

Delete the last sentence and substitute the following:

The minimum sample size tested shall be 65 lb (30 kg).

ON PAGE 492, SUBSECTION 703.12- SAMPLING AND TESTING

Delete “ASTM D4791” and substitute the following:

Idaho Field Operating Procedures (FOP) of the Quality Assurance Manual for ASTM D 4791.

ON PAGE 494, SUBSECTION 704.02- JOINT SEALER FOR ASPHALT AND CONCRETE PAVEMENTS

Delete “ASTM D 3405” and substitute “ASTM D6690 Type II”

ON PAGE 495, SUBSECTION 704.05- SILICONE SEALANT *

Delete the first sentence and substitute the following:

Low modulus silicone joint sealant material shall meet the requirements of ASTM D 5893.

ON PAGE 497, SUBSECTION 706.01- GENERAL REQUIREMENTS FOR CONCRETE PIPE

Delete “cement” from the first sentence.

Add the following:

Manufacturers furnishing concrete pipe must hold current certification under either the NPCA Plant Certification Program, the PCAA Plant Certification Program or the ACPA Q-Cast Plant Certification Program. *

ON PAGE 506, SUBSECTION 708.06- STRUCTURAL STEEL AND RELATED MATERIALS *

Delete the last paragraph and substitute the following:

The maximum tensile strength shall be 150 ksi (1035 MPa) for bolts 1 in. (25 mm) or less in diameter and 120 ksi (828 MPa) for larger bolts.

ON PAGE 515, SUBSECTION 708.07- SUBSECTION NOT USED *

Delete this Subsection and substitute the following:

708.07- Steel Guardrail Posts. W-beam and thrie-beam guardrail posts shall be manufactured using AASHTO M270M (ASTM A709B) Grade 250 steel unless corrosion resistant steel is required in which case the post shall be manufactured from AASHTO M270M (ASTM A709B) Grade 50W steel. The dimensions of the cross-section shall conform a W150x13.5 section as defined in AASHTO M160M (ASTM A6m). W150x12.6 wide flange posts are an acceptable alternative that is considered equivalent to the W150x13.5.

After the section is cut and all holes are drilled or punched the component shall be zinc-coated according to AASHTO M111 (ASTM A123) unless corrosion resistant steel is used. When corrosion resistant steel is used the portion of the post to be embedded in soil shall be zinc-coated according to AASHTO M111 (ASTM A123) and the portion above the soil shall not be zinc-coated, painted or otherwise treated.

ON PAGE 517, SUBSECTION 708.16- RIGID POSTS FOR DELINEATORS, SNOW POLES, AND MILEPOSTS OR KILOMETER POSTS

Delete the first paragraph and substitute the following:

Finished steel posts for delineators shall weigh a minimum of 1.12 lb./ft. (1.66 kg/m) and shall conform to ASTM A 702, Steel B; they shall be coated with a deep green, baked-on enamel finish.

Delete the second paragraph.

ON PAGE 518, SUBSECTION 708.16- RIGID POSTS FOR DELINEATORS, SNOW POLES, AND MILEPOSTS OR KILOMETER POSTS *

Delete the information in the Table titled “CHAIN LINK POSTS AND BRACES” and substitute the following:

Fence Height		Pipe Section		C-Section (Class does not apply)	
		Min Size in. -od (mm o.d.)	**Min Weight lb./ft. (kg/m)**	**Min Size in. (mm)**	**Min Weight lb./ft. (kg/m)**
Line Posts					
6 ft. (1.8 m) or Less	Class 1	1.9 (48.3)	2.72 (4.0)	1.875 x 1.625 (48 x 41)	1.85 (2.7)
	Class 2	1.9 (48.3)	2.28 (3.4)		
8 ft. (2.4 m) or Less but > 6 ft. (1.8 m)	Class 1	2.375 (60)	3.65 (5.4)	1.875 x 1.625 (48 x 41)	2.28 (3.4)
	Class 2	2.375 (60)	3.09 (4.6)		
Corner and End Posts					
6 ft. (1.8 m) or Less	Class 1	2.375 (60)	3.65 (5.4)		
	Class 2	2.375 (60)	3.09 (4.6)		
8 ft. (2.4 m) or Less but > 6 ft. (1.8 m)	Class 1	2.875 (73)	5.79 (8.6)		
	Class 2	2.875 (73)	4.64 (6.9)		
Braces					
All Heights	Class 1	1.625 (41)	2.27 (3.4)	1.625 x 1.25 (41 x 32)	1.35 (2.0)
	Class 2	1.625 (41)	1.82 (2.7)		

Class 1 pipe lengths longer than those shown shall comply with the weights relative to min O.D. shown in ASTM F1083, Schedule 40. Interpolation of the weights shown in ASTM F1083 will be allowed.

Class 2 pipe lengths longer than those shown shall comply with the requirements for Class 1 adjusted per the formula below:

Wt_{C2}(lb./ft.) = 0.7574 x Wt_{C1}(lb./ft.) + 0.2814 (lb./ft.) OR Wt_{C2}(kg/m) = 0.7574 x Wt_{C1}(kg/m) + 0.2814(kg/m)

where Wt_{C2} =Weight (lb./ft.) required for Class 2 posts
Wt_{C1} =Weight (lb./ft.) required for Class 1 posts.

where Wt_{C2} =Weight (kg/m) required for Class 2 posts
Wt_{C1} =Weight (kg/m) required for Class 1 posts

<u>ON PAGE 519, SUBSECTION 708.17- STEEL AND ALUMINUM SIGN SUPPORTS</u>

Delete the last sentence in the third paragraph and substitute the following sentence:

"Anchor bolts, nuts, and washers shall conform to ASTM F 1554."

Delete the fifth paragraph.

Under the "Steel Structure List" Add "ASTM F 1554 (anchor bolts)"

<u>ON PAGE 520, SUBSECTION 708.17- STEEL AND ALUMINUM SIGN SUPPORTS</u>

Delete from the first sentence of the second paragraph the word "two" and substitute "three".

ON PAGE 522, SUBSECTION 708.19- ILLUMINATION POLES AND BASES

Delete from the second sentence of the first paragraph following the table of specifications the word "wind" and substitute "design".

ON PAGE 523, SUBSECTION 708.19- ILLUMINATION POLES AND BASES

Delete from the fourth and fifth paragraphs "structural and wind" and substitute "design".

ON PAGE 526, SUBSECTION 709.02- CONCRETE ADMIXTURES – GENERAL *

Add the following:

Admixtures containing chlorides, flourides, sulphites, and nitrates shall not be used.

ON PAGE 526, SUBSECTION 709.05- WATER REDUCING ADMIXTURES

Add the following:

709.06 Lithium Nitrate Admixtures. Lithium nitrate admixture shall consist of a 30% aqueous lithium nitrate solution. The lithium nitrate admixture used in the concrete shall be the same brand and from the same manufacturer as that reported in the mix design and used in the concrete alkali-silica reaction mitigation testing. Use shall follow all manufacturer's recommendations.

ON PAGE 527, SUBSECTION 710.02- WOOD SIGN POSTS AND SNOW POLES

Delete from the heading and throughout the subsection "and Snow poles".

ON PAGE 528, SUBSECTION 710.03- GUARDRAIL POSTS AND SPACER BLOCKS *

Delete Title and 1st sentence and substitute:

710.03 Wood Guardrail Posts and Wood Spacer Blocks. Wood guardrail posts and wood spacer blocks shall be rough, S2S or S4S.

ON PAGE 530 & 531, SUBSECTION 710.09- PRESERVATIVE TREATMENT

Delete this subsection and substitute the following:

710.09 Preservative Treatment. All timber and lumber requiring preservative treatment shall be treated in accordance with the American Wood-Preservers' Association (AWPA) standards and specifications. These specifications include the following: storing and curing the timber and lumber, the wood preservatives, the preservative treatment process, documenting the results of the treatment, inspection, testing and the identification of properly treated timber. Unless otherwise specified in the contract, all timber and lumber shall be treated in accordance with Section C-14 of the latest addition of the AWPA standards.

All cutting, boring, chamfering, routing, surfacing, and trimming shall be done prior to treating. Any field drilling or cutoffs shall be treated by two liberal applications of a compatible preservative. The applications shall be in accordance with the requirements of AWPA Standard M-4.

All charges shall consist of pieces of the same species that are similar in form, size, moisture content, and receptivity of treatment. The pieces in the charge shall be separated to ensure contact of treating medium with all surfaces. The method of determining the retention of the preservatives shall be by assay.

The Certificate of Treatment shall include the following information:

Name and location of the wood preserving company
Customer identification
Date of treatment and charge number
Type of chemical used and the amount of retention by assay
Treating process and identification of the specifications used
Description of material that was treated
Signature of a responsible plant official

All timber and lumber to be used in aquatic environments, unless specified otherwise in the contract, shall be chemically treated using Best Management Practices (BMPs). The producer of the chemically treated products shall supply a written certification that the BMPs were utilized, including a description and appropriate documentation of the BMPs used. This information may be included with or on the Certificate of Treatment record.

Sign posts and fence posts shall be pressure treated with Ammoniacal Copper Zinc Arsenate (ACZA), Chromated Copper Arsenate (CCA), Copper Naphthenate or Pentachlorophenol in accordance with the latest version of American Wood Preservers Association Standards (AWPA) P5, P-8, P-9 and C-14, except:

The minimum retention of the preservative in the wood as determined by assay shall be as follows:

	lbs. /ft^3	(kg/m^3)
Ammoniacal Copper Zinc Arsenate (ACZA)	0.40	(6.4)
Chromated Copper Arsenate (CCA)	0.40	(6.4)
Copper Naphthenate	0.060	(0.96)
Pentachlorophenol	0.50	(8.0)

Guardrail post and block spacers shall be pressure treated with Ammoniacal Copper Zinc Arsenate (ACZA), Chromated Copper Arsenate (CCA), Copper Naphthenate or Pentachlorophenol in accordance with the latest version of American Wood Preservers Association Standards (AWPA) P5, P-8, P-9 and C-14, except:

The minimum retention of the preservative in the wood as determined by assay shall be as follows:

	lbs. /ft^3	(kg/m^3)
Ammoniacal Copper Zinc Arsenate (ACZA)	0.50	(8.0)
Chromated Copper Arsenate	0.50	(8.0)
Copper Naphthenate	0.075	(1.2)
Pentachlorophenol	0.60	(9.6)

Treated posts shall be subject to inspection by the Engineer after arrival at the site and no previous inspection at the plant shall bar rejection.

Certified treating reports shall be furnished for all treated timber products to be shipped. Assay reports shall be furnished for a minimum of one out of four charges shipped. One copy of each treating report and assay report shall be shipped with the posts, and a second copy of each report shall be sent to:

ITD Materials Engineer
PO Box 7129
Boise, ID 83707

The treating plant shall imprint legible symbols in the end of all timber products treated indicating the name of the treating company and the type and year of treatment in accordance with AWPA Standard Ml and M6.

ON PAGE 537 & 538, SUBSECTION 711.04- RIPRAP *

Delete from the first sentence of the first paragraph: “suitable salvaged concrete, or concrete in sacks”.

Delete Part 3 Sack Riprap and Part 4 Concrete Stabilized Riprap. *

ON PAGE 538, SUBSECTION 711.05- SEED *

Delete from the first paragraph “noxious weed free”.

Add the following:

Seed shall be certified by the state of Idaho or authorized (or approved) state agency and be declared “noxious weed free” prior to acceptance.

ON PAGE 538 & 539, SUBSECTION 711.06- PLANTS *

Delete the text of this subsection and substitute the following:

Plants shall conform to the applicable requirements of the American Standard for Nursery Stock. Plants shall be true to type and name in accordance with Standard Plant Names prepared by the American Joint Committee on Horticultural Nomenclature. Plants shall be sound, healthy, vigorous, well branched, and densely foliated when leaves are present, and free of disease and/or insects including adult eggs, pupae, or larvae. Plants shall also be free from disfiguring limbs, knots, limb scars, sun scald, abrasions of the bark, wind or freezing damage, or other disfigurements. Plants shall not be cut back from larger sizes to meet specified sizes. The presence of noxious weeds at the source or in the containers may be cause for rejection of plants.

Plants shall be nursery grown unless collected plants are specified. Plants shall be grown or conditioned to those similar to the project site including elevation, site and soil conditions, and climate or the plants may be rejected.

The term "nursery grown" shall include collected woods-grown or natural seedling trees and shrubs, provided such trees and shrubs have been growing continuously in one nursery for the following minimum periods of time:

Plant Material	**Time in Nursery**
Trees	2 Growing Seasons
Shrubs, Evergreens	2 Growing Seasons

Shrubs, Deciduous ..... 1 Growing Season

Vines ..... 1 Growing Season

Trees shall have straight trunks, well-branched with symmetrical tops. Trees shall have no unhealed scars more than 3/4 in. (20 mm) diameter.

Containerized plants shall be well established in the container with a root system sufficiently developed to retain its shape and hold together when removed from the container. Plants shall not be pot bound, nor have kinked, circling, or bent roots. Plants not properly established or root bound in containers will not be accepted. Plants furnished in pots or containers shall be of a size specified in the plans.

Deciduous plants may be supplied bare-root (B.R.) unless specified otherwise. Plants furnished bare-root shall be one size group larger prior to pruning than the sizes specified in the plans. Deciduous plants furnished bare-root shall be packed in moisture-retaining material.

Broadleaf evergreen plants and conifers shall be furnished balled and burlapped (B&B) or in suitable containers. Balled and burlapped plants, except seedlings, shall be packed with a firm ball of earth surrounded with burlap firmly held in place by a cord or wire wrapping. Balled and burlapped plants shall have firm, natural earth balls of standard size (in accordance with the American Standard for Nursery Stock) and the root collar shall be within the top two inches (2") of the soil ball. Balled and burlapped plants shall be handled only by the ball and shall be protected against drying and freezing. Broken or loose balls or plants without an adequate root system will not be accepted.

Collected plants shall not be dug until they have been inspected. Collected plants shall be dug with a greater ball or root spread for the applicable plant type as stated in the USA Standard for Nursery Stock.

Packing and shipping of plants shall conform to the applicable requirements set forth in the USA Standard for Nursery Stock.

Required state and federal inspection certificates for plant shipments shall be filed with the Engineer.

Substitutions of plant materials will not be permitted unless authorized in writing and approved by the Engineer. If proof is submitted, substantiated in writing, that a plant specified is not obtainable, consideration will be given to the nearest available size or similar variety, with corresponding adjustment to the contract price.

All plants shall be labeled according to size and scientific plant name and labels shall be durable and legible. Labels shall be attached securely to all plants, bundles, and containers of plant materials when delivered. A certificate of inspection, or a copy thereof, for injurious insects, plant diseases, and other plant pests shall accompany each shipment or delivery of plant materials. The certificate shall indicate the name, address and the source of the stock.

The labels shall be left on at least one plant of a group of the same species and on each plant of individual planting during and after planting operations within the same area.

Allowable anti transpirants are polymer gels; spray on chemicals or natural products.

<u>ON PAGE 539, SUBSECTION 711.08- SOIL CONDITIONER</u> *

Delete the text of this subsection and substitute the following:

Soil conditioner shall consist of compost, peat moss, sedge peat, bark or other approved natural material and shall be reasonably free of wood substances and contain 50 percent organic matter by weight. Soil

conditioner shall be certified by the state of Idaho or authorized (or approved) state agency and declared "noxious weed free" prior to acceptance. Product shall include inspection certificate from approved commercial or state laboratory or manufacturer's certification prior to acceptance. The source shall be approved prior to shipping to the project.

ON PAGE 539, SUBSECTION 711.09- SELECT TOPSOIL *

Add the following to the first paragraph:

Approved sources shall be visually inspected for noxious weeds by the County Weed Authority prior to delivery or placement on the project. Sources shall be tested if noxious weeds are located within or adjacent to the source site and shall be certified as "noxious weed free" by the State of Idaho authorized (or approved) state agency and declared "noxious weed free" prior to acceptance.

ON PAGE 540, SUBSECTION 711.09- SELECT TOPSOIL *

Delete the first sentence and substitute the following:

"Select topsoil shall conform to the following:.

ON PAGE 540, SUBSECTION 711.10- MULCH *

Add the following before the 1st paragraph:

Mulch shall be certified by the State of Idaho or authorized (or approved) State agency and declared "noxious weed free" prior to acceptance.

ON PAGE 541, SUBSECTION 711.11- EROSION BLANKETS *

Add the following after the 1st partial paragraph:

The solid blanket or liquid mixture may consist of either a pre-manufactured roll or a mixture sprayed on the ground. The type of blanket shall be as specified or pre-approved prior to application. Erosion Blanket shall be certified by the State of Idaho or authorized (or approved) state agency and declared "noxious weed free" prior to acceptance.

ON PAGE 541, SUBSECTION 711.13- DUST OIL *

Delete this subsection.

ON PAGE 551, SUBSECTION 714.01- GENERAL REQUIREMENTS

Delete the second and third sentences of the first paragraph and substitute the following:

When the contract or source approval requires fly ash concrete, Class F shall be used , and the available alkalies in the fly ash (as Na2O)shall not exceed 1.5 percent. In addition Calcium Oxcide (CaO) content shall not exceed 11 percent.

ON PAGE 558, SUBSECTION 718.05- DRAINAGE GEOTEXTILE PROPERTY REQUIREMENTS

Delete the table and substitute the following:

Geotextile Property	**Test Method**	**Minimum Average Roll Values**	
		Type I [1]	Type II
Grab Tensile Strength – lb. (N) (In either principal direction)	ASTM D 4632	80 (365)	180 (800)
Grab Elongation (%)	ASTM D 4632	NA	
Puncture Strength – lb. (N)	ASTM D 4833	35 (155)	80 (355)
Apparent Opening Size (AOS) (Std. Sieve)	ASMT D 4751	0.212 mm (#70) Or Finer	
Permittivity (sec-1)	ASMT D 4491	0.7	0.7

ON PAGE 558, SUBSECTION 718.06- RIPRAP/EROSION CONTROL GEOTEXTILE PROPERTY REQUIREMENTS

Delete the table and substitute the following:

Geotextile Property	**Test Method**	**Minimum Average Roll Values**	
		Type I [1]	Type II
Grab Tensile Strength – lb. (N) (In either principal direction)	ASTM D 4632	130 (580)	200 (890)
Grab Elongation (%)	ASTM D 4632	15	15
Puncture Strength – lb. (N)	ASTM D 4833	60 (270)	80 (355)
Trapezoidal Tear – lb. (N)	ASTM D 4533	40 (180)	50 (225)
Apparent Opening Size (AOS) (Standard Sieve)	ASTM D 4751	#50 (0.3 mm) or Finer	
Permittivity (sec-1)	ASTM D 4491	0.5	0.5
Ultraviolet (UV) Radiation Stability	ASTM D 4355	70% Strength Retained @150 hrs.	

ON PAGE 559, SUBSECTION 718.07- SUBGRADE SEPARATION GEOTEXTILE PROPERTY REQUIREMENTS

Delete the table and substitute the following:

Geotextile Property	**Test Method**	**Minimum Average Roll Values**	
		Type I	Type II [1]
Grab Tensile Strength – lb (N) (In either principal direction) [2]	ASTM D 4632	180/115 (800/510)	270/180 (1200/800)
Grab Elongation (%) [2]	ASTM D 4632	<50%/≥50%	<50%/≥50%
Puncture Strength – lb (N) [2]	ASTM D 4833	70/40 (310/180)	100/75 (445/335)
Trapezoidal Tear Strength – lb (N)	ASTM D 4533	70/40 (310/180)	100/75 (445/335)
Apparent Opening Size (AOS) [3] (Standard Sieve)	ASTM D 4751 COE CW-002215	#30 (0.60 mm) or Finer	
Permittivity (sec-1) [3]	ASTM D 4491	0.02	0.02

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FOR 2004 IDAHO STANDARD SPECIFICATIONS

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*** Revised from January 2006 Version**

June 28, 2006

Mr. Stephen Moreno
Division Administrator
Federal Highway Administrator
Idaho Division
Boise, ID 83707

Subject: Supplemental Specifications

Re: HFO-ID. 4

Dear Mr. Moreno:

Enclosed are the July 2006 Supplemental Specifications for the 2004 edition of the Idaho Standard Specification Book, as well as SSP 415.

We are requesting your approval of these supplemental specifications and SSP.

Sincerely,

GENE WORTHAM, P.E.
Construction Engineer

GW:dc

SUPPLEMENTAL SPECIFICATIONS

ON PAGE 3, SUBSECTION 101.01- ABBREVIATIONS

Incorporate the following in alphabetic order:

ACPA American Concrete Pipe Association
NPCA National Precast Concrete Association
PCAA Precast Concrete Association of America

ON PAGE 4, SUBSECTION 101.02- DEFINITIONS

Delete the last paragraph and substitute the following:

Contract items are numbered to correspond to sections of these specifications. Special provision contract items are numbered beginning with an "S" followed by either a section number to which work is similar, or to a 900 generic series number.

ON PAGE 6, SUBSECTION 101.02- DEFINITIONS *

Add the following after the definition of Overburden:

Pavement Structure: The structure that is constructed on the roadbed and typically includes pavement surfacing, base courses and granular subbase.

ON PAGE 7, SUBSECTION 101.02- DEFINITIONS *

Delete the Roadbed definition and substitute the following:

Roadbed: The top of subgrade, upon which the pavement structure, curbs, sidewalks, median and other incidental facilities are constructed.

ON PAGE 8, SUBSECTION 101.02- DEFINITIONS *

Delete the Subgrade definition and substitute the following:

Subgrade: Materials directly below the pavement structure. It is either natural in-place material, as in excavated areas, or compacted fill material, as in embankments.

ON PAGE 18, SUBSECTION 104.03- CHANGES AND EXTRA WORK

In the first sentence of Part 4 delete "720" and replace with "seven (7) calendar".

ON PAGE 19, SUBSECTION 104.03- CHANGES AND EXTRA WORK

Delete Part 9, and substitute the following:

9. Prime Contractor's Overhead and Profit: When extra work is performed by an approved first or lower tier subcontractor, or by owner-operator, compensation to the prime Contractor for overhead and profit will be in accordance with the following:

		Prime Contractor's Compensation
To	$10,000	10%
Over	$10,000	$1,000 + 5% of excess over $10,000

Bid items with a price per unit in the original contract, which are included in the extra work, are not eligible for additional overhead and profit. Prime Contractor's overhead and profit will be calculated on the total amount of subcontracted and/or owner-operator work.

Delete the first sentence of Part 10 and substitute the following:

> It is considered that overhead and profit for the subcontractor are included in the agreed price, and no additional compensation, above that provided for the prime Contractor's overhead and profit, will be allowed.

ON PAGE 22 & 23, SUBSECTION 104.06- MAINTENANCE OF PUBLIC HAUL ROADS

Delete the first sentence of the second paragraph and substitute the following:

Dust nuisance due to the Contactor's hauling operations on public highways, streets and special detours shall be abated in a satisfactory manner by the application of water as directed.

Delete from the last sentence, "205.17"

ON PAGE 25, SUBSECTION 105.01- AUTHORITY OF THE ENGINEER AND SUSPENSION OF WORK

Delete Parts 3, 4, & 5 and substitute the following:

3. Upon receipt, the Engineer will evaluate the Contractor's request. If the Engineer agrees that the cost and/or time required for the performance of the contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the Engineer will make an adjustment and modify the contract in writing accordingly. The Engineer will notify the Contractor of the determination whether or not an adjustment of the contract is warranted.

4. In making the contract adjustment a markup for profit will only be allowed on changed or extra work caused by the delay or suspension. No profit will be allowed on any other delay or suspension costs including, but not limited to, standby costs or extended indirect costs. Payment for changed and extra work will be made in accordance with Subsection 104.03.

5. No contract adjustment will be allowed unless the Contractor has submitted the request for adjustment within the time prescribed.

6. No contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided for or excluded under any other term or condition of this contract.

7. In case of suspension of work the Contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project; provide for normal drainage;

protect erodible surfaces by approved erosion and sediment control measures; prevent water pollution and prevent damage by sedimentary deposits; and erect any necessary temporary structures, signs, or other facilities. During such period of suspension of work, the Contractor shall also properly and continuously maintain, in an acceptable growing condition, all living material in newly established plantings, seedings, and soddings furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

ON PAGE 26, SUBSECTION 105.02- PLANS AND WORKING DRAWINGS.

Add the following to the 2nd paragraph:

The Contractor shall furnish the Engineer one set of reproducible 3 mil mylar copies of the approved drawings prior to completion of the project for any item that becomes a permanent part of the completed structure.

ON PAGE 26, SUBSECTION 105.03- CONFORMITY WITH PLANS AND SPECIFICATIONS.

Add the following to the 2nd paragraph:

A schedule of price adjustments is provided in the ITD Laboratory Operations Manual for certain non-specification material that is allowed to remain in place.

ON PAGE 27, SUBSECTION 105.04- COORDINATION OF PLANS, SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS, AND SPECIAL PROVISIONS.

Add the following to the first partial paragraph.

The details shown in the bid schedule shall govern when in conflict with other project documents.

ON PAGE 31, SUBSECTION 105.11- INSPECTION OF WORK

Add the following after the first full paragraph:

If, during or prior to construction operations, the Engineer fails to reject defective work or materials, whether from lack of discovery of such defect or for any other reason, such initial failure to reject in no way prevents the later rejection when such defect is discovered, or obligates the Department to final acceptance. The Department is not responsible for losses suffered due to any necessary removals or repairs of such defects.

ON PAGE 34, SUBSECTION 105.17- CLAIMS FOR ADJUSTMENTS AND DISPUTES

Delete from the first sentence of the third full paragraph “6030” and substitute “60”.

ON PAGE 40, SUBSECTION 105.17- CLAIMS FOR ADJUSTMENTS AND DISPUTES

Add the following after Part 2.

The Department and Contractor agree that all arbitration panels will be composed of three (3) members.

ON PAGE 43, SUBSECTION 105.18- CLAIM REVIEW BOARD SPECIFICATIONS

Delete the last sentence and substitute the following:

The CRB may consult technical and legal experts if the need arises under provisions provided for elsewhere in Subsection 105.18. See **Deliberations.**

ON PAGE 45 & 46, SUBSECTION 105.18- CLAIM REVIEW BOARD SPECIFICATIONS

Delete the paragraph on the bottom of page 45 thru the top of page 46.

Delete the second full paragraph on page 46 beginning with "If more than one CRB…" and substitute the following:

If a replacement CRB member is required for a particular claim hearing, he or she will be selected from among the alternate CRB members using the following process. The Contractor and the Department (the parties) will toss a coin to see who goes first. The parties will then take turns striking names off the alternate list until one name is left. This will be the replacement CRB member for that particular claim hearing.

If a replacement CRB member or alternate is required for the standing board (3-year term), he or she will be selected jointly by the AGC Highway Construction Committee and the Department (the parties) using the following process. The Department will provide to the AGC a copy of the resumes of all persons on the current DRB Pre-Qualified Roster. The parties will each nominate 3 individuals from the Roster and notify the other party. The nominees for CRB member may already be CRB alternates. All the nominees will be combined into one list. The parties will flip a coin to decide who goes first. The parties will then take turns striking names off the list until one name is left. This will be the new CRB member or alternate.

ON PAGE 50, SUBSECTION 105.18- CLAIM REVIEW BOARD SPECIFICATIONS

Add the following after the paragraph under the heading of Deliberations:

If the CRB desires special services such as legal, technical, or other expert assistance or testimony, or other consultation, accounting, data research, and the like, the CRB will make a request in writing to both parties (Contractor and the Department) briefly defining the scope and estimated budget for the services. If they agree to the request the Contractor and the Department will execute an agreement with a mutually agreeable service provider. The Contractor and the Department will share the costs for the service provider equally. The service provider will bill the Contractor who will pay the full amount of the invoice after approval by both parties. The Contractor will then bill the Department for 50% of the approved invoice amount. The Department will then promptly make payment to the Contractor along with the CRB billings.

In the typical situation the special service provider will respond to the CRB's questions in private consultation between the provider and the CRB and no permanent record of the questions or responses will be required by the Contractor or the Department. However, if mutually agreeable, these typical operating procedures may be modified. In arriving at its findings and recommendations the CRB will not be bound by any information provided by the special service provider.

ON PAGE 54, SUBSECTION 105.18- CLAIM REVIEW BOARD SPECIFICATIONS

Delete the second paragraph and substitute the following:

If the CRB desires special services such as legal, technical, or other expert assistance or testimony, or other consultation, accounting, data research, and the like, both the Contractor and The Department must agree to provide the special services, and the procedures under the heading, **Deliberations**, will be followed.

ON PAGE 59, SUBSECTION 105.19- TECHNICAL ANALYSIS SUPPORT

Delete the last sentence of the first paragraph.

Delete the last sentence of the second paragraph and substitute the following:

The TE will bill the Contractor who will pay the full amount of the invoice after approval by both the Contractor and the Department. The Contractor will then bill the Department for 50% of the approved invoice amount. The Department will then promptly make payment to the Contractor.

ON PAGE 64, SUBSECTION 105.20- VALUE ENGINEERING CHANGE PROPOSALS (VECP)

Delete (5) and substitute the following:

(5) If the VECP requires the services of a Professional Engineer as required by Idaho Code, the VECP shall be stamped by a Professional Engineer licensed in the State of Idaho.

ON PAGE 65, SUBSECTION 106.01- SORCE OF SUPPLY AND QUALITY REQUIREMENTS

Delete from the second sentence of the second paragraph "qualified products list" and substitute: "Qualified Products List (QPL)".

ON PAGE 65, SUBSECTION 106.03- SAMPLES, TESTS, CITED SPECIFICATIONS *

Add after the first paragraph:

Payment will be made when the required acceptance sampling, testing, and/or certification meets the requirements of the contract.

ON PAGE 66, SUBSECTION 106.03- SAMPLES, TESTS, CITED SPECIFICATIONS

Add after the first paragraph:

Testing performed on the Contractor's behalf for plant mix designs, alkali-silica reactivity expansion and dispute resolution shall be performed under the direct supervision of a Professional Engineer licensed in the state where the testing is performed. Test reports shall be stamped by the supervising Professional Engineer licensed in the state where the testing is performed.

Delete the third paragraph and substitute the following:

Quality assurance will be in accordance with the Department's Quality Assurance Program as contained in the ITD Quality Assurance manual as perscribed in the special provisions, except sampling and test methods.

All sampling and test methods prescribed in the contract, including, but not limited to WAQTC, ASTM, AASHTO, Idaho Test Methods, etc., shall be in accordance with the edition of the test methods in effect on January 1st of each year.

ON PAGE 66, SUBSECTION 106.04- CERTIFICATION OF MATERIALS

Add the following:

Certification shall reference the project and item numbers for which the material is intended.

ON PAGE 68, SUBSECTION 106.08- FIELD LABORATORY

Delete the first sentence of the second full paragraph and substitute the following:

The Contactor shall provide a commercially comparable, 200-ampere 125/250 volt service, single phase, four wire, 60 cycle AC service to the outlet of the field laboratory or field office, unless otherwise approved.

Delete the third, fourth, and fifth full paragraphs and substitute the following:

The Contractor shall provide a service for electrical hook-up. The service shall be equipped with a feeder assembly compatible with the requirements of the current National Electrical Code (NEC). This assembly shall be rated for 200 ampere service, unless otherwise approved.

ON PAGE 71, SUBSECTION 106.09- MATERIAL SOURCES

Add the following:

> The Contractor shall be responsible for construction and maintenance of haul roads from materials sources to the site of the work or to the nearest public road. Maintenance shall include dust abatement.
>
> Discharge of turbid waters which would create pollution shall not be allowed into any streams or other bodies of water.

ON PAGE 71, SUBSECTION 106.10- PREPARATION OF MATERIAL SOURCE

Delete the heading of this subsection and substitute the following:

106.10 Preparation of Department Controlled Material Source.

ON PAGE 71, SUBSECTION 106.11- PRODUCTION OF MATERIAL

Delete from the second sentence of the first paragraph "designated sources," and substitute "department controlled sources,"

ON PAGE 78, SUBSECTION 107.07 - USE OF EXPLOSIVES *

Delete the second paragraph and substitute with the following:

The primary objective for blasting operation is to excavate rock in a safe and stable manner that leaves the rock outside the limits of excavation undisturbed, and results in excavated slopes that conform to the lines and grades indicated on the Plans. A secondary objective of the blasting operation is to provide material for applications such as embankment construction, erosion control, aggregate, and other project needs. The Contractor shall perform the blasting operations in a safe and professional manner to provide rock meeting project requirements.

A. Blasting Plan Submittals

1) Preliminary Blasting Plan:

Not less than ten working days before commencing test or production drilling and blasting operations, the Contractor shall submit a Preliminary Blasting Plan for review. The Preliminary Blasting Plan shall contain general details of the proposed drilling and blasting patterns and controls that the

Contractor proposes to use for both the controlled and the production blasting. The list below shall be used as a guide for the information required in the Preliminary Blasting Plan.

a. Station limits of the proposed shot(s) including limits of blasting left and right of centerline, number of holes to be drilled and shot per blast.

b. Scaled plan and section views of the proposed drill pattern including free face, burden, spacing, blast hole diameter, blast hole angles, lift height and subdrill depth. Plan views and section views shall be based upon the project plan sheets including topographic contours.

c. Loading diagram showing the type and amount of explosives, primers, initiators and location and depth of all stemming including the material to be used as stemming. Maximum quantity of explosive to be used per delay and per blast.

d. A diagram and explanation of the initiation sequence(s) of blast holes including delay times for each blast hole. The type of delay system shall be shown with all associated delay periods.

e. Manufacturer's product information sheets or technical bulletins for all explosives, primers, delays and initiators to be employed.

f. Proposed quantities of controlled blasting and production blasting.

g. Safety Plan – The safety plan shall contain, at a minimum, the following information:

1) Proposed methods describing how fly rock or blast debris shall be prevented.
2) The name and telephone number of the Blaster-in-Charge. The Blaster-in-Charge will be responsible for directing the day to day drilling and blasting operations, for clearing the blast site before excavation of the blasted material may proceed, and for all required report preparation such as daily blast logs, and daily explosive material consumption and loss reports.
3) Methods proposed to clear the blast area and to control access to the blasting site during loading and blasting.
4) Methods proposed to notify local residents and construction workers of an impending blast.
5) Methods proposed to document, assess and correct misfires or undetonated explosives. A recovery and disposal plan shall also be developed in the event that misfires cannot be refired.
6) Methods proposed and planned to control ground vibration and air blast as well as calculated scaled distances to each effected structure.
7) A detailed vibration and blast monitoring plan.
8) A fire prevention and protection plan.
9) A plan to identify all potential blast site electrical hazards, including, but not limited to a lightning detection and protection plan.
10) An emergency plan in the event an injury occurs. At least one blast crew member should be trained in first aid procedures.

2) <u>Detailed Blasting Plan:</u>

Following a review of the Preliminary Blasting Plan, a Detailed Blasting Plan for each blast site shall be submitted for review and approval. The Detailed Blasting Plan shall be site specific. Detailed Blasting Plans shall also contain the above information supplemented by site specific information as necessary for successful and safe blasting completion. The Detailed Blasting Plan shall include the details of Test Blasting procedures, design, and expected results.

<u>Test Blast</u>

The Contractor shall demonstrate the adequacy of the proposed Detailed Blasting Plan by drilling, blasting and excavating short test sections. The Test Blast sections shall not be less than 50 feet (15 m) nor greater than 100 feet (30 m)in length for controlled blasting and not less than 50 blast holes for production test blast. Test blasting shall be completed and approved prior to commencing full-scale drilling and blasting operations. Test blast areas shall be wholly contained within production blast areas, and shall not be incorporated into final plan excavation slope, except as approved. Test sections shall be performed for all variations of the Detailed Blasting Plan(s) and backslopes. This will include final backslopes excavated with or without controlled blasting. The test section shall be performed to demonstrate that the blast will not damaged the final slope, that acceptable rock fragmentation is provided, and that fly rock, ground vibration and air blast are properly controlled.

3) Revised and Supplemental Detailed Blasting Plan:

After satisfactorily completing the test blast sections, and incorporating all test blast results, the Detailed Blasting Plan shall be revised and submitted as the *Revised* Detailed Blasting Plan. The requirements of the Revised Detailed Blasting Plans shall be the same as those for the Detailed Blasting Plan.

The Contractor shall submit Supplemental Detailed Blasting Plans anytime the blasting operation differs from the parameters provided in the Preliminary Blasting Plan, prior Detailed Blasting Plan, or as requested due to poor results of the blasting, damage to the backslope, or any unsafe condition.

Production drilling and blasting shall not begin until the Detailed Blasting Plan has been submitted, reviewed, tested and if necessary, revised. The Engineer will review the blast submittals solely for conformance with the project plans and specifications. Review of blast plans shall not relieve the Contractor of his responsibility for the accuracy, adequacy and safety of the plan when implemented in the field.

C. Blasting Operations

All blasting operations, including the transport, storage, handling, and loading of explosives and blasting agents, including primers and initiators, shall be performed under the direct supervision of the Blaster-in-Charge, and in accordance with the applicable provisions of the Standard Specifications and all other pertinent Federal, State, and local regulations.

Each cap period shall come from one lot number. Mixing of lot numbers for any one cap period is prohibited. All blasting materials used on the project shall be one year or less of age.

The Contractor shall conform to all applicable State and Federal laws governing explosives transport, handling, loading, and storage. The Contractor shall submit his storage plans along with the type of magazine or explosive storage facility to be used on and off the job site.

When, as determined by the Engineer or the Contractor, any blasting product is either of excessive age or in a deteriorated condition, all blasting work shall cease until the product's age or quality can be determined. Products that do not meet the manufacturer's specifications shall not be used on the project and shall be removed from the project and properly disposed of immediately.

No blasting product shall be brought to the job site if the date codes are missing. The Engineer may require the product to be tested by an independent organization to determine its performance as compared to the manufacturer's product information sheet. The independent testing organization shall be approved prior to performing the tests. If product performance or composition deviates by more than 10 percent in

any manner from the manufacturer's data sheet, that lot of product shall be rejected, and the Contractor shall bear all costs for the testing and the replacement of the product.

Production blast holes shall be drilled on the patterns shown on the blasting plan submitted by the Contractor. The production blast holes shall be drilled within two (2) blast hole diameters of the staked hole location. The location and staking of the blast holes shall be the responsibility of the Contractor and shall be incidental to the contract item. If more than five (5) percent of the holes are drilled outside of this tolerance, the Contractor shall be required to fill these holes with crushed stone or approved material and then to re-drill them at the proper location.

Production holes shall not exceed 4 inches (100 mm)in diameter unless approved and proven by test blast procedures. Detonation of production holes shall be on a delay sequence toward a free face.

It is the Contractor's responsibility to take all necessary precautions in the production blasting to prevent blast damage to the rock final slope or backslope.

The blast holes shall be checked and measured by the Contractor before any explosives are loaded into any of the blast holes. If the blast holes are not drilled to the correct depth, are plugged, or are unable to be fully loaded, the Contractor shall be required to clean out or re-drill those holes that do not meet the contract requirements or match the blasting plan.

If more than five (5) percent of the blast holes are shallower than those shown in the blast plans, the Contractor shall be required to re-drill the shallow holes to proper depth at his expense.

Stemming for production blasting shall consist of angular crushed aggregate passing the 3.8 inch (96.5 mm) sieve but retained on the No. 8 (2.36 mm) sieve. The Contractor shall prove the proposed stemming material performs as required by a test blast.

Blast holes shall be fitted with a temporary plug to keep overburden, drill cuttings or other foreign material from falling into the holes after drilling. The depth of the blast hole shall be recorded and made visible to the Engineer at the drill hole collar.

The Engineer will, at all times, have the authority to prohibit or halt the Contractor's blasting operations if it is apparent that, through the methods being employed, the required slopes are not being obtained in a stable condition or the safety of the public is being jeopardized.

Where controlled blasting is required to form the final backslope, the Contractor will not be allowed to drill ahead of the test blast area until the test section results have been completely evaluated. If the results of the test blast(s) are unsatisfactory as determined, the Contractor shall adopt such revised methods as are necessary to achieve the required results. Unsatisfactory test blast results include unstable slopes, fragmentation beyond the indicated lines and grade, flyrock, excessive ground vibration or air blast or violation of other requirements within these specifications. All costs incurred by the Contractor in adopting revised blasting methods necessary to produce an acceptable test blast shall be the sole responsibility of the Contractor.

If at any time during the progress of the work, the methods of drilling and blasting do not produce the desired result of a stable, safe, and uniform slope, within the tolerances specified, the Contractor shall be required to drill, blast, and excavate in short sections, not exceeding 100 feet (30 m) in length, until satisfactory results are achieved. All extra costs shall be the sole responsibility of the Contractor.

All other requirements for controlled and production blasting operations covered elsewhere in this specification shall also apply to the blasting carried out in conjunction with the test blast.

1. Safety Procedures

No blasting shall take place before sunrise or after sunset.

A fire prevention and protection plan, and lightning detection and protection plan shall be included in the Contractor's blasting plan. The Contractor shall provide a plan to prevent entry into the blasting site by unauthorized personnel during the loading and blasting operations. Prior to each blast, all explosive packing materials shall be removed from the site and be properly disposed of.

a. Warnings and Signals. The Contractor shall establish a method of warning all personnel on the job site of an impending blast. The signal shall consist of a five-minute warning signal to notify all in the area that a blast will be fired within a five-minute period. A second warning signal shall be sounded one minute before the blast. After the blast is over, there shall be an all clear signal sounded so all in the area understand that all blasting operations are finished.

b. Check for Misfires. The Contractor shall observe the entire blast area for a minimum of five minutes following a blast to guard against rock fall before commencing work in the area.

   After the five-minute delay, it shall be the Blaster-in-Charge's responsibility to go into the shot area and check all holes to make sure that they have detonated. If any holes have not fired, these misfires will be handled by the Blaster-in-Charge before others enter the work area. Traffic shall remain closed and the blast site shall remain off limits to all but authorized personnel until all potential explosion hazards have been eliminated. The Blaster-in-Charge shall correct all misfires in a safe manner. If a misfire poses problems that cannot safely be corrected by the Blaster-in-Charge, then a consultant or an explosive company representative skilled in the art of correcting misfires shall be called in to rectify the problem. The Contractor shall be solely responsible for all costs resulting from misfires.

c. Flyrock Control. Before the firing of any blast in areas where flying rock may result in personal injury or unacceptable damage to property or the work, the Contractor shall provide an acceptable method to control flyrock. If flyrock occurs during the blasting operations to the extent of endangering workers, equipment, or is propelled outside the project limits all blasting operations shall cease until the Contractor reviews the blast and determines the cause and solution to the flyrock problem. Before blasting resumes, a written report shall be submitted to for review. The written report shall include determined cause and remedial steps to ensure correction.

d. Scaling and Stabilization. All rock on the cut face that is loose, hanging, or otherwise may create a potentially dangerous situation as determined, shall be removed or stabilized during or upon completion of the excavation in each lift. Drilling of the next lift shall not be allowed until this work has been completed.

   The slopes shall be scaled throughout the duration of the contract and at such frequency as required to remove all loose rocks, overhangs, or hazards. The slopes shall be hand scaled using a suitable standard steel mine scaling rod. Subject to the Engineer's approval, other methods such as machine scaling, hydraulic splitters or light blasting may be used in lieu of or to supplement hand scaling. The extent of the scaling will be determined by the Engineer who will determine the completion of the work. Scaling necessitated by the structural geology of the rock shall be paid for at the appropriate unit price or force account.

   If in-place stabilization is required, as determined to be required, rock bolting, rock dowelling or other Engineer approved stabilization techniques shall be used. Stabilization necessitated by the structural geology of the rock and unaffected by the blasting shall be paid for at the appropriate unit price or force account.

Stabilization or scaling necessitated, , by the Contractor's blasting operations, shall be performed at the Contractor's expense.

2. Daily Blasting Logs. The Contractor shall provide the Engineer, on a weekly basis, a daily log of blasting operations. The log shall be updated at the close of each business day. The log shall include the number of blasts, times, dates of blasts, blasting locations, patterns and all information shown below:

   a. Station limits of the shot(s) and the number of holes blasted including limits left and right of centerline and the number and depth of holes blasted.
   b. Plan and section views of drill pattern including free face, burden, blast hole spacing, blast hole diameters, blast hole angles, lift height, and sub drill depth.
   c. Loading diagram showing type and amount of explosive, primers, initiators and location and depth of stemming.
   d. Initiation sequence of blast holes including delay times and delay system in each blast hole.
   e. Trade names and sizes of all explosives, primers, and initiators to be employed.
   f. Signature of the Blaster-in-Charge.
   g. All ground vibration and air blast (noise) records.

   The blasting logs are for quality control and record keeping purposes. Review of the blast log shall not relieve the Contractor of his responsibility for the accuracy and adequacy of the blasting log.

3. Daily Explosive Material Consumption and Report of Loss Report. The report shall include the signature of the blaster-in-charge. The Contractor shall comply with all Federal, State and Local law, regulations, and conditional use permits.

4. Traffic Safety. Whenever blasting is planned within 1000 feet (305 m) of a roadway the contractor shall provide a traffic control plan for review and approval. The signs shall be covered or removed when there are no explosives in the area or the area is otherwise secure. Prior to blasting, the blaster-in-charge shall determine whether road users in the blasting zone will be endangered by the blasting operation. If there is danger, road users shall not be permitted to pass through the blasting zone during blasting operations.

5. Pre-blast Survey. Prior to any blasting on the project, the Contractor shall conduct a Pre-blast Survey of both the interior and exterior of all adjacent buildings, structures, and utilities and other structures that may be subject to damage from blast induced ground vibration or air blast over pressure or any structure as directed. The Pre-blast Survey shall document the existing condition of these items in sufficient detail to later determine if the Contractor's blasting operation has caused any damage. The Contractor shall submit a copy of the survey to the Engineer and the owners of the structures no less than seven (7) days prior to any blasting.

6. Post-blast Survey. Not later than two (2) weeks after the conclusion of blasting operations or as required, the Contractor shall re-examine all of the items inspected during the Pre-blast Survey. Each item will be re-examined using the Pre-blast Survey photos, and audio and/or video tape to confirm that no change has occurred to any of these items. Owners shall be notified if any change has occurred. The property owner/resident shall be pre-contacted for an inspection appointment. The Contractor shall initial a check off sheet for all structures included in the Pre-blast Survey.

   Within 30 days after the conclusion of blasting operations, or as directed, the Contractor shall submit to the Engineer and the property owners a final written Post-blast Survey Report addressing all of the items inspected in the Pre-blast Survey as performed by the Contractor. Any apparent damages observed or measured in the Post-blast Survey shall be specifically noted in the report.

All damage to public or private property caused by the use of explosives shall be repaired, as a first order of work, by the Contractor, at no additional expense to the State.

ON PAGE 81, SUBSECTION 107.11- CONTRACTOR'S RESPONSIBILITY FOR WORK

Delete the text of this Subsection and substitute the following:

A. General

All work and material for the contract, including any change order work, shall be done and furnished at the sole risk of the Contractor until the entire improvement has been completed and final acceptance granted by the Engineer, except as provided in this subsection.

The Contractor shall rebuild, repair, restore, and make good all damages to any portion of the permanent or temporary work occurring before the final acceptance date and shall bear all the expense to do so, except damage to the permanent work caused by:

1. Acts of God. This is defined as cataclysmic natural phenomena such as tornadoes, earthquakes, floods, and officially declared natural disasters.
2. Acts of the public enemy or governmental authority.

Provided, however, that these exceptions shall not apply should damages result from the Contractor's failure to take reasonable precautions or to exercise sound engineering and construction practices in conducting the work.

If the performance of the work is delayed as a result of damage by others, an extension of contract time will be evaluated in accordance with Subsection 108.06.

B. Relief of Responsibility for Completed Work

The Contractor may be relieved of the duty of maintaining and protecting portions of the work that have been accepted in accordance with Subsection 105.16. If this is the case the Contractor will be relieved of the responsibility for damages to said completed portions of the work resulting from use by the public traffic, or from the action of the elements, or from any other cause, but not from damage resulting from the Contractor's operations or negligence.

C. Relief of Responsibility for Damage by Public Traffic

When it is necessary for public traffic to utilize a highway facility during construction, the Contractor will be relieved of responsibility for damages to the permanent work by public traffic under the following circumstances:

1. The work is in accordance with the contract plans or approved stage construction plans,
2. The work is on a section of roadway required by contract to be opened to public traffic, and
3. The traffic control is in accordance with the approved traffic control plans.

If traffic is relocated to another section of roadway, the Contractor shall resume responsibility for the work until such time as the section of roadway is again open to public traffic or the Contractor submits a written request for work that is completed to a point where relief can be granted in accordance with paragraph B above.

D. Repair of Damage

The Contractor shall promptly repair all damage to either temporary or permanent work as directed by the Engineer. For damage qualifying for relief under Paragraphs A, B and C above, payment will be

made using the method(s) deemed appropriate by the Engineer, either: (1) at contract unit prices, (2) in accordance with 104.03, (3) in accordance with 109.03 or, (4) the Engineer may elect to have the repair work done by others or by State forces. Payment will be limited to repair of damaged work only. No payment will be made for delay or disruption caused by damage to, or repair of, the temporary or permanent work.

ON PAGE 85, SUBSECTION 107.19- FENCING

Add the following:

When necessary to remove fencing, the fencing shall be replaced by the contractor in equal or better condition than prior to removal.

ON PAGE 106, SUBSECTION 109.03- EXTRA AND FORCE ACCOUNT WORK

Delete from Part 4 a "The Rental Rate Blue Book published by Dataquest, Inc.," and substitute "The Rental Rate Blue Book published by Equipment Watch (A PRIMEDIA Business Directories & Book Group),"

ON PAGE 109 & 110, SUBSECTION 109.03- EXTRA AND FORCE ACCOUNT WORK

Delete Part 8 through the end of this subsection, and Substitute the following:

8. Prime Contractor's Overhead and Profit: When work on a force account basis is performed by an approved first or lower tier subcontractor, or by owner-operator, compensation to the prime Contractor for overhead and profit will be in accordance with the following:

		Prime Contractor's Compensation
To	$10,000	10%
Over	$10,000	$1,000 + 5% of excess over $10,000

Bid items with a price per unit in the original contract, which are included in Force Account work, are not eligible for additional overhead and profit. Prime Contractor's overhead and profit will be calculated on the total amount of subcontracted and/or owner-operator work.

Approval of this additional amount will be made after receipted invoices are furnished by the Contractor.

Force account work shall be adjusted daily upon duplicate report sheets furnished by the Engineer and signed by both parties, which daily reports shall thereafter be considered the true record of the force account work done.

ON PAGE 111, SUBSECTION 109.05- PARTIAL PAYMENTS

Delete the last three paragraphs and substitute the following:

The Contractor shall pay each Subcontractor or supplier for satisfactory performance of its contract no later than 20 calendar days from receipt of each payment the Contractor receives from the Department. The Contractor shall return retainage to each Subcontractor or supplier within 20 calendar days after the subcontractor's or supplier's work is satisfactorily completed.

The Contractor shall certify with each estimate payment that payment to Subcontractors or suppliers has been made within the prescribed time frames. The certification will be made on forms provided by the Department, and returned within 20 calendar days of receiving the estimate payment.

These requirements shall also apply to first or lower tier subcontractors or suppliers.

ON PAGE 114, SUBSECTION 201.03- CONSTRUCTION REQUIREMENTS

Delete the third paragraph and substitute the following:

Disposal of materials shall not be done by open burning.

ON PAGE 119-131, SECTION 205 – EXCAVATION AND EMBANKMENT *

Delete the text of this section and substitute the following:

205.01 Description. This work shall consist of excavation, embankment, blasting, disposal, or compaction of all material not being removed under some other item, which is encountered within the limits of the work necessary for the construction of the roadway.

This work shall include the removal and disposal of structures or any miscellaneous obstructions which are visible or are indicated on the plans which encroach upon or obstruct the work and for which no separate bid item is provided.

A. *Excavation.* This work shall include all excavation performed under this item regardless of the material encountered. Excavation may be divided into appropriate schedules. The excavation volume in each schedule will then be identified as "Excavation, Schedule No. 1," or "Excavation, Schedule No. 2," etc., as shown on the plans.

B. *Blasting.* This work includes the use of explosives to excavate rock and shall be in conjunction with Subsection 107.07.

1. *Production Blasting*. Production blasting, as covered herein, refers to the rock fragmentation blasts resulting from more widely spaced production holes drilled throughout the main excavation area adjacent to the controlled blast line or from the production holes in a rock quarry. Production holes shall be detonated in a controlled delay sequence.

   It is the Contractor's responsibility to take all necessary precautions in the production blasting to minimize blast damage to the final cut slope.

   The row of production blast holes immediately adjacent to the controlled blast line shall be drilled on a plane approximately parallel to the controlled blast line. Production blast holes shall not be drilled closer than 6 feet (1.8 m) to the controlled blast line. The bottom of the production holes shall not be lower than the bottom of the controlled blast holes. The production holes shall not exceed 3.5” in diameter.

2. *Controlled Blasting.* Controlled blasting shall consist of drilling and shooting a linear series of line holes for controlling the neat line of the final back slope along the final excavation line. Only those holes drilled, loaded with explosives, and detonated for the above purpose will be considered and measured as controlled blasting. Controlled blasting techniques, as covered herein, shall be used for forming final rock cut slopes at the locations shown on the plans or called for in the Special Provisions or as directed.

Controlled blasting refers to the controlled use of explosives and blasting accessories in carefully spaced and aligned drill holes to produce a free surface or shear plane in the rock along the specified final excavation backslope. Controlled blasting techniques covered by this specification shall include presplitting and cushion blasting.

Presplitting is defined as the detonation of the presplit holes before the detonation of any adjacent production holes. Cushion blasting is defined as the detonation of the cushion blast holes after the detonation of the adjacent production holes.

Controlled blasting shall be required in the excavation of rock or cemented materials where cut slopes, shown on the plans, are equal to or steeper than 3/4H:1V. This provision shall apply even if the main excavation can be ripped. This provision shall not apply in rock quarry operations. Unless otherwise allowed by the Engineer, the Contractor shall begin the controlled blasting tests with the controlled blast holes spaced 24 inches (600 mm) apart, and then adjust the spacing only as approved in writing by the Engineer. Blast hole spacing for controlled blasting shall not exceed 30 inches (915 mm).

Pioneering the top of cuts and preparing a working platform to begin the controlled blast drilling operations may require unusual working methods and use of equipment. The Contractor may use angle drilled holes or fan drilled holes during the initial pioneering operations to obtain the desired rock face. The blast hole diameter requirements for controlled blasting are applicable for pioneering work.

The Contractor shall completely remove all overburden soil and loose or decomposed rock along the top of the excavation for a distance of at least 30 feet (9 m) in all directions beyond the excavation limits or to the limits and slopes shown on the plans before drilling the controlled blast holes.

As directed, potentially dangerous boulders or other material located beyond the excavation limits shall also be removed before drilling controlled blast holes. Payment for removal of the material located beyond the excavation limits shall be considered incidental.

a. *Presplitting.* All presplitting shall be performed in accordance with the following requirements:

   The presplit drill holes shall not exceed 3 inches (75 mm) in diameter.

   The Contractor shall control his drilling operations by the use of proper equipment and technique to insure that no hole shall deviate from the plane of the planned slope by more than 9 inches (230 mm) either parallel to or normal to the final excavation slope. No payment will be made for presplit holes exceeding these tolerances.

   Presplit holes shall be drilled within 3 inches (75 mm) of the staked control blast hole location. If more than five percent of the presplit holes are outside of the 3 inch (75 mm) tolerance, they will be filled with crushed stone, stemmed and re-drilled.

   All drilling equipment used to drill the presplit holes shall have mechanical, electro-mechanical, or electronic devices affixed to that equipment to accurately determine the angle at which the drill steel enters the rock. Presplit hole drilling will not be permitted if these devices are either missing or inoperative.

   Presplit holes shall extend a minimum of 30 horizontal feet (9 m) beyond the limits of the production holes to be detonated or to the end of the cut as applicable.

The length of presplit holes for any individual lift shall not exceed 30 feet (9 m) unless approved. Before the specified lift height may be exceeded, test blasting by the Contractor and at the expense of the Contractor may be performed if approved. Test blasts shall not be closer than 30 feet (9 m) to the final excavation face and shall not be made part of the final excavation face.

When the cut height requires more than one lift, a 24 inch (600 mm) offset between lifts shall be permitted to allow for drill equipment clearances. The Contractor shall begin the control blast hole drilling at a point which will allow for necessary offsets and shall adjust, at the start of lower lifts, to compensate for any drift which may have occurred in the upper lifts.

Sub-drilling a minimum of 2 feet (0.6 m) below final ditch grade shall be performed to facilitate removal of the toe berm.

Before placing charges the Contractor shall determine the hole is free of obstructions for its entire depth. All necessary precautions shall be exercised so the placing of the charges will not cause caving of material from the walls of the holes.

Drill hole conditions may vary from dry to filled with water. The Contractor shall use whatever type(s) of explosives and/or blasting accessories necessary to accomplish the specified results.

The diameter of explosives used in presplit holes shall not be greater than one-half the diameter of the presplit hole.

Bulk ammonium nitrate and fuel oil (ANFO) will not be accepted as explosive for controlled blasting.

Only standard explosives specifically manufactured for presplitting shall be used in presplit holes.

The bottom charge of a presplit hole may be larger than the line charges but shall not be large enough to cause overbreak. The top charge of the presplitting hole shall be placed far enough below the top of the control blast hole, and reduced sufficiently, to avoid overbreaking and heaving.

Proper stemming of all controlled blasting holes shall be required. Stemming for controlled blasting shall consist of angular crushed aggregate passing the 3/8 inch (9.5 mm) sieve but retained on the No. 8 (2.36 mm) sieve.

As long as satisfactory presplit slopes are obtained, the Contractor may either detonate the presplit blasting holes forming the slope face before drilling for production blasting or may detonate the presplit blasting holes forming the slope face and the production blast holes within the same blast event, provided that the presplitting drill holes are detonated ahead of the adjacent production blast holes. If required to reduce ground vibrations or noise, presplit holes may be delayed, provided the hole to hole delay is no more than 25 milliseconds.

The presplit slope face shall not deviate more than 9 inches (230 mm) from a plane passing through adjacent drill holes, except where the character of the rock is such that, irregularities are unavoidable. The 9 inches (230 mm) tolerance shall be measured perpendicular to the plane of the planned final cut slope.

b. *Cushion Blasting.* Where the horizontal distance from the cut face to the existing rock face is less than 15 feet (4.5 m), the Contractor may cushion blast in lieu of presplitting. Cushion

blasting is where the detonation along the final cut face will be performed only after the detonation of all adjacent production holes has occurred. Differences in delay times between the cushion blasting line and the nearest production row shall not be greater than 75 milliseconds or less than 25 milliseconds. With the exception of the above criteria, the requirements previously given for presplitting shall also apply to cushion blasting.

C. *Embankment.* Embankments are generally constructed with soil, aggregates, rock, or a mixture of these materials. Other materials shall be used only when specified.

1. *Soil Embankment.* Soil embankments are constructed with materials that can be tested for in-place dry density in accordance with WAQTC FOP for AASHTO T-310, Method B.

2. *Rock Embankment*. Rock embankments are constructed with materials that are too granular to test as described in Subsection 205.03, Part E.

3. *Embankment with other materials.* Other materials, instead of soil or rock, may be used in embankments if specified. These materials may include wood fibers, light-weight concrete, broken glass, geofoam, etc. Recycled glass shall meet the requirements of Subsection 711.15.

205.02 Materials.

A. *Borrow*. Borrow shall be obtained from designated or approved sources.
B. *Granular Borrow.* Granular borrow shall consist of sand, sand-gravel, and sand and rock mixtures, and shall be obtained from designated or approved sources. Material selected shall have a sand equivalent greater than 30.
C. *Dust Abatement.*
1. Water for dust control shall conform to Subsection 107.17.
2. Other dust abatement materials shall be as specified.
D. *Other materials.* Materials other than soils or rock used for the construction of embankments shall be as specified.

205.03 Construction Requirements.

A. *General.* The Contractor shall not proceed beyond the dimensions and elevations established. No material shall be removed from any area to be worked prior to being staked and cross-sectioned. The roadway shall be maintained in such condition that it will be well drained at all times. The Contractor shall maintain the subgrade during construction in accordance with Subsections 105.13, 105.14 and 105.15.

The environment and cultural resources shall be protected in accordance with the provisions of Subsection 107.17 and 107.18, respectively.

Material shall not be wasted without permission. The excavation and borrow operations shall be so scheduled that no unauthorized waste of excavation will result.

Materials may be designated as unsuitable that cannot be properly utilized in embankments. All unsuitable material shall be disposed of as directed. The Contractor shall be responsible for furnishing an approved site for the disposal of excess or unsuitable materials. Disposal of bituminous material shall comply with the requirements of Subsection 107.17. No separate payment will be made for the acquisition or operation of the site.

Erodible surfaces of cut and embankment slopes shall be protected by measures outlined in Section 212 - Erosion and Sediment Control.

Material originating outside the staked lines of cutslopes which slides into the roadway due to causes beyond the control of the Contractor, shall be removed and disposed of and the cutslopes refinished as directed.

B. *Slope Finishing.* Slope finishing shall be in accordance with ITD's Erosion and Sediment Control Manual and the plans and specifications.

Loosened or shattered rocks that will not remain in their natural position shall be removed from the slopes. Overbreak, consisting of rocks shattered or loosened outside the staked lines of cutslopes by the Contractor's operation that constitutes a safety hazard shall be removed and disposed of.

C. *Process Old Road.* Scarify the old road to full depth and spread to form a uniform foundation when the old road surfacing is within 5 ft. (1.5 m) of the top of subgrade.

D. *Soft Spot Repair.* Soft spot repair shall restore the subgrade to meet the compaction and density requirements of Subsection 205.03-F Classes of Compaction and Density Requirements, Class A Compaction.

Ifmaterial is determined unsuitable, the Contractor shall remove and dispose of the material. If the material is suitable except for excessive moisture content, the material shall be dried to the proper moisture content. At the Contractor's option, the suitable material may be replaced with approved materials at no additional cost to the state. The limits of areas included in soft spot repair will be determined.

When soft spots are caused by a failure to comply with Subsection 105.13 or 105.14, the repair shall be at the Contractor's expense.

E. *Embankment Construction.*

The natural ground surface shall be prepared by removing vegetation, topsoil and other unsuitable materials, and by scarifying to provide a bond with the new embankment.

No embankment material shall be placed until the foundation has been approved. Embankments shall not be constructed with frozen materials or on snow covered or frozen foundations.

All embankments constructed on slopes steeper than 5 horizontal to 1 vertical shall be keyed into the preexisting slope with horizontal benches that have a vertical face approximately 5 ft. (1.5 m) in height. Each bench shall be sloped to drain. Material excavated from the benches may be incorporated in the embankment or wasted as directed.

Any seepage encountered shall be drained from the embankment as shown on the plans or as directed.

Across swampy ground or saturated soils, the first lift of the embankment shall be constructed by end-dumping. The thickness of this lift shall provide a stable surface. The remainder of the embankment shall be constructed in layers as specified.

Embankment material containing excessive moisture shall be allowed to dry to a moisture content that will permit the required compaction.

The Contractor shall provide sufficient water to facilitate compaction at no cost to the State.

1. *Soil Embankments.* Soil embankments shall be placed in horizontal layers not to exceed 8 in. (200 mm) in loose thickness. Each layer shall be uniformly compacted at approved uniform moisture content to the requirements of the class of compaction shown in the Special Provisions or the plans.

2. *Rock Embankments.* Rock embankments shall be constructed in horizontal layers no thicker than 18 in. (500 mm). The placement of isolated individual, competent rock fragments having dimensions greater that the specified layer thickness will be permitted if:

a. The clearance between adjacent rocks provides adequate space for placement and compaction equipment to compact the materials in horizontal layers as specified.

b. The rocks are placed more than 36 in. below the top of subgrade.

When a majority of the embankment materials are rocks or rock fragments, they shall be distributed in a manner that avoids nesting and provides spacing between the rocks to allow for filling with smaller rocks and soils.

i. *Compaction less than 18" Below Top of Subgrade*: Rock material placed less than 18 in. (500 mm) below the top of subgrade and rock backfill of overexcavated areas in rock cuts shall be constructed in layers not exceeding 9 inches (230 mm) thick, unless directed otherwise. Each layer shall be uniformly compacted with a minimum of 12 full coverage's of a vibratory roller meeting the minimum requirements stated below. Vibratory rolling may be reduced by one full coverage for each increase of 5,000 lb. (2300 kg) per impact above the minimum. In no case will less than 6 full coverage's per 9 in. (230 mm) lift, or fraction thereof, be allowed.

ii. *Compaction more than 18" Below Top of Subgrade*: Rock Material placed more than 18 in. (500 mm) below the top of subgrade shall be uniformly compacted with a minimum of three full coverage's for each 6 in. (150 mm) of lift thickness or fraction thereof with rollers of the following minimum requirements:

1. Vibratory rollers having a rated centrifugal force of 30,000 lb. (13 600 kg) per impact and at least 1000 vibrations per minute. The Contractor shall limit the speed of vibratory rollers to no more than 130 ft./min. (40 m/min.)

2. Grid rollers having a static weight of at least 20,000 lb. (9000 kg) and 4,000 lb./ft. (6000 kg/m) of drum width. The Contractor shall limit the speed of grid rollers to no more than 350 ft/min. (115 m/min.)

Rolling requirements may be reduced one coverage per 6 in. (150 mm), or fraction thereof, for each increase of 5,000 lb. (2300 kg) per impact for vibratory rollers or 1,000 lb./ft. (1500 kg/m) of drum width for grid rollers. In no case will less than one complete coverage for each 6 in. (150 mm) of lift thickness, or fraction thereof, be allowed.

3. Density Determination. The maximum dry density shall be determined in accordance with the following applicable test methods:

Moisture-Density Relations of Soils ..... AASHTO T 99 Method A or C
Correction for Coarse Particles in the Soil
Compaction Test.....AASHTO T 224
Family of Curves – One point Method.....AASHTO T 272
Compaction Standard for Coarse Granular Materials
by Use of the Vibratory Spring-Load Compactor ..... Idaho T-74

In lieu of Idaho T-74 and when approved, the maximum dry density of coarse granular material shall be determined in accordance with the following test method:

Moisture-Density Relations of Soils .....AASHTO T 180
Method D

Determination of in-place density and percent compaction shall be by the following test methods:

In Place Density and Moisture Content of Soil and Soil-Aggregate
by Nuclear Methods (Shallow Depth)..... WAQTC FOP for AASHTO T 310
Method B

A block of concrete weighing a minimum of 75 lb. (34 kg) and well seated on a compacted base may be substituted for the compaction base specified in AASHTO T 99.

F. Classes of Compaction and Density Requirements. Compaction shall meet the requirements of one of the following classes.

If the class of compaction is not specified, Class A compaction will be required.

Prior to placement, soil embankment materials shall be moisture conditioned or dried to a moisture content range of 4% under optimum moisture content to 2 % over optimum moisture content when applying AASHTO T 99 or AASHTO T 180.

Materials at the bottom of excavations shall be scarified to a depth of 8 inches (200 mm), moisture conditioned as required and compacted to the requirements of Class A compaction.

If more than 10 percent is retained on the ¾" (19 mm) sieve, a correction for coarse particles by AASHTO T 224 is required when using AASHTO T 99, Method C or AASHTO T 180, Method D.

a. Class A Compaction. This work shall be performed as follows:

1. Materials classified to be a coarse gravel and soil mixtures or coarse gravels that are too granular to test by WAQTC FOP for AASHTO T 310, Method B, having a Sand Equivalent less than 30 and having more than 30 percent retained on the ¾" (19 mm) or having more than or equal to 10 percent retained on the 3" inch (75 mm) shall be compacted with the requirements identified in Subsection 205.03.E.2 – Rock Embankments. The minimum sample size tested will be 65 lbs (30kg).

2. Materials classified to be clean, free draining, sands and gravels <u>and</u> having more than or equal to 30 percent retained on the No. 4 (4.75mm) and less than 10 percent retained on the 3" inch (75 mm) and having a Sand Equivalent greater or equal to 30 shall be compacted to a minimum of 95 percent of maximum dry density based on the percent passing the No.4 sieve as determined by Idaho T 74; in addition if less than 30 percent is retained on the ¾" sieve, and if approved, a minimum of 95 percent of maximum dry density of AASHTO T-180, Method D.

3. Materials classified to be sands and gravels with fine materials (i.e. silty sands with gravel, clayey sands with gravel, etc) <u>and</u> having more than 10 percent retained on the No. 4 Sieve (4.75 mm) and less than 30 percent retained on the ¾" inch (19 mm) shall be compacted to a minimum of 95 percent of maximum dry density as determined by AASHTO T 99, Method C.

4. Materials classified to be fine grained soils (i.e. silts, clays, sandy silts, sandy clays, etc) <u>and</u> having more than 90 percent passing (less than or equal to 10 percent retained on) the No. 4 (4.75 mm) sieve shall be compacted to a minimum of 95 percent of maximum dry density as determined by AASHTO T 99, Method A.

5. Embankment and backfill material placed outside an approximate 2:1 shall be compacted to Class D.

b. Class B Compaction. This work shall consist of compacting embankment and backfill material for the top 12 in. (300 mm) of subgrade to the density standards for class A compaction. Other soil embankment more than 12 in. (300mm) below the top of subgrade shall be compacted by routing all construction equipment uniformly over the entire surface of each layer. Additional rolling may be directed if routing of equipment is unsatisfactorily performed.

c. Class C Compaction. This work shall consist of compacting of selected areas under embankments to the density standards for Class A compaction to a depth of 8 in. (200 mm). The station limits of Class C compaction will be as shown on the plans or as directed. The width will be between top of subgrade shoulders.

d. Class D Compaction. This work shall consist of compacting the median and the slope. The compaction shall consist of not less than one complete coverage with approved track-type or rubber-tired earthmoving equipment. The embankment shall be placed in lifts not to exceed 12 in. (300 mm) in depth of material before compaction. The fill material must be moist.

e. Construction of Embankment with Other Materials. Embankments constructed with materials other than soil or rock shall be as specified.

205.04 Method of Measurement. Excavation, borrow, excavation of soft spots, soft spot repair and granular borrow will be measured by the cubic yard (cubic meter) in its original position from field survey or photogrammetric cross sections, using the average end area method with no correction for curvature, or by the ton (metric ton).

Where it is impractical to measure material by either the average end area method or in its original position, alternate practical methods with appropriate adjustments may be used. The total will not include the volume of any material used for purposes other than those directed. No payment will be made for rock excavation made below top of subgrade elevations unless such excavation is required by the plans or directed. No allowance will be made for borrow replaced by unauthorized rock or soil excavation below top of subgrade.

Channel change excavation shall include only that excavation necessary to construct the channel or ditch from established bank elevation to flow line grade. Earthwork necessary to construct the cut or fill to bank elevation will be included in the roadway quantities. Overbreak will not be included in the measurement of excavation.

Class C compaction and the processing of old road surfacing will be measured by the unit. A unit is 1000 SY (a metric unit is 1000 square meters).

Water ordered for dust abatement will be measured by the MG (cubic meter). (1 MG = 1000 gals.) by means of calibrated tanks or distributors or by means of accurate water meters.

Controlled blasting will be measured by the foot (meter) of drilled hole. Only those holes drilled, loaded with explosives, and detonated for the purpose of creating a final excavation face will be considered and measured as controlled blasting.

When payment for granular borrow is on the weight basis, the water in excess of 4 percent of the dry weight of the material will not be paid for unless otherwise provided. The amount of material for which payment will be made will be corrected for moisture content, as determined in accordance with AASHTO T-255.

205.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Excavation	CY (m^3)
Excavation Schedule No.	CY (m^3)
Controlled Blasting	ft. (m)
Channel Change Excavation	CY (m^3)
Borrow	CY or Ton (m^3 or t)
Granular Borrow	CY or Ton (m^3 or t)
Class C Compaction	Unit)
Process Old Road	Unit
Water for Dust Abatement	MG (m^3)
Excavation of Soft Spots	CY (m^3)
Soft Spot Repair	CY (m^3)

Overbreak will not be paid for.

Embankment is considered incidental. No separate payment will be made for any embankment work performed. Costs shall be included under other earthwork items.

Removal and disposal of unsuitable material from below top of subgrade shall be paid under excavation of soft spots. Any backfill material used to replace subgrade excavation shall be paid under its respective item or as extra work.

Payment for production blasting shall be incidental to the contract unit price for roadway excavation or respective materials source item in rock quarry operations.

Soft spot repair shall include excavation, drying, and replacement and compaction of the in-place soil; or with approval, Contractor's optional replacement and compaction.

Backfill will be paid for at the contract price for the item used.

Removal of slides, slumps, settlements and associated work not caused directly by the contractors operations will be paid for at the contract unit price for excavation existing where the slide occurred or as extra work in accordance with Subsection 104.03.

Any water which the Engineer orders the Contractor to apply for the purpose of controlling dust for safety and comfort of the traveling public; for the health and comfort of people working on or residing near the project; to protect crops from possible damage from dust or which is applied in the public interest, will be paid for as Water for Dust Abatement.

Excavation which must be stockpiled or stored prior to final placement, including topsoil, will be paid for at the contract unit price for each handling approved, unless paid for as another item of work for the second handling.

<u>ON PAGE 135, SUBSECTION 210.03- CONSTRUCTION REQUIREMENTS</u> *

Add the following after the 6th paragraph:

For backfill material placed within 3 ft (.09 m) of any concrete structure or any type of retaining wall, the Contractor shall uniformly distribute the backfill material in layers of not more than 8 in. (200 mm) and compact with lightweight compacting equipment having impact force of 1000 lbs. (455 kg) to 3,000 lbs. (1365 kg). The backfill shall be compacted to the density standards for Class A compaction in Subsection

205.03, Part F, Classes of Compaction, before successive layers are placed. For backfill material which os determined as too granular to test, the number of compacting equipment passes shall be a minimum of five (5) passes per 8" (200 mm) or less lift.

ON PAGE 139, SUBSECTION 212.02- MATERIALS

Delete pipe subsection reference "708.21" and substitute "706".

ON PAGE 151, SUBSECTION 212.05- BASIS OF PAYMENT

Delete from the last sentenceof the first paragraph: "SSP-640" and substitute "Section 640".

ON PAGE 151, SUBSECTION 213.02- MATERIALS

Add the following:

Vegetative matter shall be incorporated into topsoil, except brush, trees, and noxious weeds. Microorganism inoculants shall contain a diverse mix of regional specific mycorrhizal species for specific condition, provide macro- and micronutrients to plants, be tolerant of chemical imbalances in the soil, produce humic compounds and binding compounds, and improve soil structure.

ON PAGE 151, SUBSECTION 213.03- CONSTRUCTION REQUIREMENTS

Add the following before the 1st sentence of the 1st paragraph:

Topsoil shall be excavated to a depth of at least 6 in (150 mm), unless otherwise directed.

Add the following to the 1st paragraph:

Topsoil stockpiles shall be treated with temporary soil stabilization measures and sediment and erosion control measures immediately upon completion of the stockpile and as required by the contract.

Add the following after the 1st paragraph:

Topsoil stockpiles shall not exceed 4 ft (1.3 m) in height unless otherwise approved. If the stockpile is undisturbed for longer than 3 months, the top 1 ft (0.3 m) shall be mixed with the remainder of the stockpile to ensure that living organisms are distributed throughout at the time of final placement, or microorganism inoculants shall be added to topsoil, after final placement, in accordance with manufacturer recommendations. Microorganism inoculants may be applied as dry granular mixes, tablets, or injectible soluble.

ON PAGE 153, SUBSECTION 301.02- MATERIALS

Delete the last two sentences of the last paragraph.

Add the following: *

Reclaimed Asphalt Pavement (RAP) may be used in granular subbase when approved. RAP shall be defined as salvaged bituminous pavement that may have minor coatings of dust or aggregate particles adherent from the reclamation process with no discernable seams, pockets, or amounts of untreated aggregate or soil. Only material meeting this definition shall be used. The size of RAP shall be 3 inch minus as determined by visual inspection in place. The RAP will be inspected daily.

ON PAGE 154, SUBSECTION 301.03- CONSTRUCTION REQUIREMENTS *

Delete 2nd full paragraph and substitute the following:

Compaction of the subbase shall meet 95% of the maximum dry density.

Add the following:

D. Reclaimed Asphalt Pavement (RAP). RAP shall be mixed in approximately equal proportions with material meeting the requirements for granular subbase. The final mix of materials shall be of uniform consistency.

In place density testing for RAP/base mixtures shall be performed at the frequency for Item 301 Granular Subbase using the following procedure:

The roller pattern shall be established by using in-place density from an uncorrected nuclear gauge. The required compaction is achieved and final process rolling is defined as when the final roller pass adds no more than 0.5 lb/ft3 (8 kg/m3) to the previous in-place density. Sufficient additional roller passes shall be made to determine that a "false break" or leveling-off point is not used for compaction density. The roller pattern shall be reestablished when mixture properties in the processed material change and at a minimum of every 7200 SY (6000 m2) of finished surface for each lift. Additional tests shall be performed where soil conditions have changed or at the discretion of the Engineer to ensure that the required compaction is achieved.

ON PAGE 156 & 157, SUBSECTION 303.02- MATERIALS

Delete the second paragraph.

Delete the last sentence and standard test method from the sixth paragraph and substitute the following:

In lieu of Idaho T-74 and when approved, the maximum dry density of aggregate base may be determined in accordance with the following:

Moisture Density Relations of Soils	AASHTO T180, Method D

ON PAGE 160, SUBSECTION 304.03- CONSTRUCTION REQUIREMENTS *

Delete the last four paragraphs and substitute the following:

Soft spots shall be repaired in accordance with subsection 205.03 D Soft Spot Repair.

ON PAGE 164, SUBSECTION 307.01- DESCRIPTION

Delete the text of this subsection and substitute the following:

This work shall consist of furnishing and placing one or more courses of open-graded rock base (rock cap) on a prepared surface in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established.

ON PAGE 165, SUBSECTION 307.03- CONSTRUCTION REQUIREMENTS

Delete the last two sentences of the first partial paragraph and substitute:

The first layer shall be compacted with a minimum of 6 full coverages, and subsequent layers shall be compacted with a minimum of 2 full coverages for each 6 of inch lift thickness with a vibratory roller meeting the following requirements: *

Vibratory rollers having a rated minimum centrifugal force of 30,000 lb. (13600 kg) per impact and at least 1000 vibrations per minute. The contractor shall limit the speed of vibratory rollers to no more than 130 ft./min. (40 m/min).

ON PAGE 170, SUBSECTION 403.02- MATERIALS *

Delete the second sentence of the fourth paragraph and substitute the following:

The method used to determine seal coat design shall be Idaho T-60 by either method or the McLeod method, completed two weeks prior to construction starting.

ON PAGE 171, SUBSECTION 403.03- CONSTRUCTION REQUIREMENTS *

Delete the fifth full paragraph and substitute the following:

No seal coat shall be applied before June 15 or after September 1.

Delete the eighth full paragraph and substitute the following:

Only pneumatic tire rollers shall be used. Rollers shall meet the requirements of Section 306 - Rolling. The rollers shall not be operated at a speed in excess of 8 mph (13 km/h). The contractor's operation shall include enough pneumatic tired rollers to make a full spread width coverage with one pass.

ON PAGES 172, SUBSECTION 403.03- CONSTRUCTION REQUIREMENTS

Delete the first paragraph and substitute the following:

Approaches shall be sealed before sealing the adjacent roadway.

Bridge decks and approach slabs shall not be seal coated without approval. All drains and bridge expansion joints shall be protected from the seal coat application, and the material used for this protection shall be removed and properly disposed of after completion of the seal coat. All asphalt and aggregate which may have spilled into drains and deck expansion joints shall be removed after completion of the seal coat.

Asphalt shall not be spread until the surface to be sealed has been cleaned as required and the section has been approved. Asphalt shall be applied by means of a pressure distributor in a uniform, continuous spread over the section to be treated and within the temperature range specified. The quantity of asphalt to be used per square yard (square meter) shall be as designed and field verified. If the texture of the surface is such that asphalt penetrates too rapidly, a preliminary application of from 0.05 to 0.10 gal/SY (0.25 to 0.5 L/m2) of surface may be required.

Delete the third paragraph and substitute the following: *

To avoid exposure of asphalt for more than three minutes prior to application of cover coat material, the length of spread of asphalt shall not be in excess of that which trucks loaded with cover coat material can immediately cover.

ON PAGES 173, SUBSECTION 403.03- CONSTRUCTION REQUIREMENTS *

Delete the first sentence of the second paragraph and substitute the following:

Immediately following the application of asphalt, cover coat material shall be spread in quantities at the designed and field verified rate.

Delete the third paragraph and substitute the following:

To eliminate or reduce the dust coating of the aggregate, all aggregate stockpiles shall be moistened with water 12 to 24 hours prior to placement.

In the fourth paragraph, delete the second and third sentences and substitute the following:

Rolling shall begin immediately behind the spreading operation and shall be continued until three complete coverages are obtained. Rolling shall be completed within five minutes of spreading of cover coat material and prior to allowing traffic to use the new surface.

ON PAGE 179, SUBSECTION 405.02- MATERIALS

Delete the first paragraph and substitute the following:

Reclaimed Asphalt Pavement (RAP) will be allowed in the Job Mix Formula. RAP is defined as salvaged bituminous material that may have minor coatings of dust or aggregate particles with no discernable seams, pockets, or amounts of base or soil. RAP stockpiles shall consist of 100% reclaimed asphaltic material prior to use. All RAP material shall be obtained from state or local roadways.

RAP shall be reduced as needed to pass through the nominal maximum size screen prior to introduction to the mix.

A maximum of 15% RAP per weight of the mix may be included as part of the job mix formula provided the mix meets all other requirements for plantmix. The Contractors mix design shall include the type and amount of recycling agent in the mixture.

Unless otherwise specified, RAP shall not be allowed in the top lift of interstate paving.

ON PAGE 181, SUBSECTION 405.02- MATERIALS

Delete the first test method and substitute the following: *

Standard Practice for Operating Inertial Profilers and Evaluating Pavement Profiles, AASHTO PP-50

Delete the fifth test method and substitute the following:

Moisture Content of Hot Mix Asphalt (HMA) by oven method…….AASHTO T 329

Delete “ASTM D4791” and substitute the following:

Idaho Field Operating Procedures (FOP) of the Quality Assurance Manual for ASTM D 4791.

ON PAGE 181, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Delete the second sentence and substitute the following

The Contractor's mix design shall provide the the Job Mix Formula (JMF) for the project using a qualified Laboratory and shall be stamped by a Professional Engineer licensed in the state where the mix design was prepared.

ON PAGE 182, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS *

Add the following before the first full paragraph:

Testing shall be conducted during the mix design to identify plant mix aggregate subject to breakdown in the ignition furnace. The mix design shall report the aggregate gradation correction factors, determined in accordance with FOP for AASHTO T 308, for specification sieves. Aggregate gradation correction factors for specification sieves will be applied in determining conformance with specifications only when determined and reported in the mix design.

The Contractor shall provide a minimum of two correction factor samples produced by the laboratory producing the mix design, at the design asphalt binder content, for each ignition furnace to be used on the project for quality control, acceptance, verification or dispute resolution testing as required. The samples shall be prepared in accordance with FOP for AASHTO T308.

Per FOP for AASHTO T308, each ignition furnace to be used on the project requires a unique asphalt binder correction factor determined using aggregate produced for the project. The asphalt binder correction factor for each furnace shall be determined at the location where project testing will be performed.

ON PAGE 186, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Move the gradation table below the last sentence of the first paragraph.

ON PAGE 187, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Delete the first sentence of the second paragraph and substitute the following:

> The Contractor shall obtain a minimum of three mix samples from each test section in the presence of the Engineer. Each mix sample shall consist of a minimum of 80 pounds of mix. Each sample shall be placed in Department approved storage containers, properly identified, and immediately submitted to the Engineer. Each 80 pound mix sample will be split by the Engineer at the Department testing laboratory in accordance with WAQTC – TM5, with half tested for acceptance and half retained by the Engineer for dispute resolution, if requested and approved.

Delete the third paragraph and substitute the following:

> The Contractor shall obtain a minimum of four random cold feed aggregate samples and immediately submit them to the Engineer for testing.

ON PAGE 188, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Delete Part 3 and substitute the following:

3. The average AASHTO T30 gradations of three randomly selected mix samples shall meet the requirements of Subsection 405.03F-Mixing for the acceptance test strip. If the test strip consists of one test section, the three mix samples will be used to determine the average AASHTO T30 gradation. If the test strip consists of more than one test section, three mix samples from the test strip will be randomly selected for AASHTO T30 gradation testing. The requirements of 703.05 (sand equivalent, fracture and flat and elongated) and 405.02

(fine aggregate angularity) shall be met based on the average tests results of the three cold feed aggregate samples.

The fourth cold feed aggregate sample will be tested for bulk specific gravity.

The bulk specific gravity of the combined aggregate (Gsb) and the bulk specific gravity of the compacted mixture (Gmb) from the test strip materials will be used in the calculation of plant mix properties.

ON PAGE 191, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Add the following to the first partial paragraph:

The maximum specific gravity value will be determined in accordance with the procedure in Idaho T-125, Acceptance Test Strip for Plant Mix Pavement.

ON PAGE 193-198, SUBSECTION 405.03- CONSTRUCTION REQUIREMENTS

Add after the second paragraph:

When sampling from truck transports, the Contractor shall provide an adequate platform at the mixing plant to enable samples to be obtained in accordance with WAQTC FOP for AASHTO T 168.

Delete Part N – Surface Smoothness and substitute the following: *

N. Surface Smoothness. The pavement placed by the Contractor shall conform to Schedule II as defined herein unless otherwise specified in the contract.

For Schedule III only, the Contractor shall perform pre-paving, quality control, and acceptance surface smoothness testing, analyze the results of this testing, and submit the results to the Engineer. Pre-paving results shall be submitted to the Engineer prior to the start of paving. Prior to paving, the Contractor shall submit a plan to the Engineer showing how Schedule III smoothness will be achieved.

Quality Control results shall be submitted to the Engineer no later than the next working day following placement.

Should the results of the quality control testing indicate surface smoothness is not within specifications, the Contractor shall suspend paving operations until it can be demonstrated that steps taken to modify operations will result in surface smoothness, which meets specifications.

Acceptance testing results shall be performed on the final lift and submitted to the Engineer prior to any corrective action. Acceptance testing shall be completed within one (1) week after completion of paving.

Quality control test results shall be reported in International Roughness Index (IRI) and may be used for acceptance provided the testing is verified. The use of quality control testing for acceptance shall be requested prior to the start of paving.

All acceptance surface smoothness testing must be verified. The profile run must be witnessed by the Engineer and a preliminary copy of the report and the graph chart shall be submitted to the Engineer immediately after the end of the run. This testing will not be accepted unless witnessed by the Engineer. At the Engineer's request, the profile data shall be submitted in a format suitable for evaluation using Proval or other acceptable software.

The State may elect to perform additional testing as verification. Should the results vary from the Contractor's results by more than 10 percent, the State's results will be used for acceptance.

In the event that Contractor wishes to dispute the smoothness results, the applicable portions of the Quality Assurance Special Provisions for dispute resolution shall apply.

Profilers shall be a Class I or Class II as defined by ASTM E950. Profilers shall be operated in accordance with the manufacturer's instructions and AASHTO PP-50. Profiler settings shall be as follows:

High pass or pre-filter – 200 ft. (61m)
Filter – Moving Average
Moving average filter length – 2 ft.
Gain – 1.0
Bump detection - on
Dip detection - on
Resolution – 0.01 in (.25 mm)

The finished pavement shall conform to the following requirements:

1. The surface shall be tested with a 10-foot (3 m) straight-edge, at locations to be determined. When the straightedge is laid on finished pavement in a direction parallel with centerline or perpendicular to centerline, the surface shall not vary more than 1/4 in. (5 mm) from the lower edge. Any high points that cause the surface to exceed these tolerances shall be removed by grinding.

2. The surface shall be profiled in accordance with these provisions:

   Profiles shall be made 3 feet (1 m) from and parallel to the inside edge of each driving lane, and in other locations as directed, with a maximum of two profiles per driving lane. When both wheel paths are profiled, the average of the results for each 0.1-mile (100 m) section will be used to calculate incentive payments and determine sections requiring corrective action.

   Pavement shall conform to the following surface smoothness schedule requirements:

   a. When longitudinal grade is 4.5 percent or less, pavement on tangent alignment and pavement on horizontal curves having centerline radius of curve 2,000 feet (600 m) or more shall meet the surface smoothness requirements for the smoothness schedule specified. Consecutive 0.1-mile (100 m) sections of roadway tested will be added together to obtain the mile (km) section. There will be no overlapping of either the 0.1-mile (100 m) or 1-mile (1 km) sections to change cumulative test results.

      Smoothness Schedule

      International Roughness Index (IRI):

      Schedule I Projects: Target IRI values - 6.0 to 7.0 in/0.1 mile (95.1 to 110.0 mm/100m). Corrective action required above 9.5 in/0.1 mile (150mm/100m)

      Schedule II Projects: Target IRI values - 7.1 to 8.0 in/0.1 mile (110.1to 125.0 mm/100m). Corrective action required above 9.5 in/0.1 mile (150mm/100m).

      Schedule III Projects: Target IRI –

1) for sections with a prepaving IRI less than 14.0 in/0.1 mile (220 mm/100m), the final index shall not exceed 7.0 in/0.1 mile (110 mm/100m), or

2) the smoother of 1) a 50 percent improvement of the pre-paving index or 2) a maximum final index of 10.0 in/0.1mile (160.0 mm/100m). Corrective action is required above the target IRI.

b. Acceptance test strips, pavement on horizontal curves having a centerline radius of curve 1,000 feet (300 m) or more but less than 2,000 feet (600 m), pavement within the super elevation transition of such curves, or any pavement with a grade greater than 4.5 percent shall be excluded from incentive/disincentive payments. These pavements shall meet the corrective action requirements for the smoothness schedule specified.

3. The following areas of pavement shall not be profiled unless otherwise specified:

a. Pavement on horizontal curves having a centerline radius of curve less than 1000 feet (300 m) and pavement within the super elevation transition of such curves.

b. Pavement within 50 feet (15 m) of a transverse joint that separates the pavement from a structure deck, an approach slab, or an existing pavement not constructed under the contract.

c. Pavement for approaches and structure decks.

The profiling equipment shall be operated at a speed no greater than that recommended by the manufacturer. It shall be calibrated at the beginning of the project and as needed thereafter.

Finished pavement shall be ground until it complies with the following smoothness requirements.

Individual high points in excess of 0.3-inch within a 25 foot (8 mm within an 8 m) distance or less, as determined by measurements of the graph chart, shall be reduced by grinding, until such high points do not exceed 0.3-inch (8 mm).

After grinding has been completed to reduce individual high points in excess of 0.3-inch (8 mm), additional grinding shall be performed in sections requiring corrective action to reduce the IRI to a maximum of 7.0 inches (110 mm) in any 0.1-mile (100 m) section along any line parallel with the pavement edge.

All grinding shall be done parallel to centerline. Adjacent grinder passes within any one ground area shall be extended to produce a neat rectangular area having a uniform surface appearance. At transverse boundaries between ground and unground areas, smoothly feathered transitions shall be made. After grinding has been completed, the ground pavement surface shall receive a fog coat in accordance with Section 408 – Fog Coat.

The grinding equipment shall be a power-driven machine that is specifically designed to smooth Portland cement concrete pavement with diamond blades. The effective wheelbase of the machine shall not be less than 12 ft (3.6 m) and cutting width shall be at least 3 ft (1 m). In lieu of diamond grinding, a self propelled milling machine of the type used for removal of asphalt pavement may be used provided a special milling head is used that is designed to provide a texture similar to diamond grinding. The cutting teeth on the milling head shall have a maximum spacing of 0.3 in (7 mm). The forward speed of the machine shall be restricted to 10 ft (3 m) per minute. Should the texture produced by milling be unsatisfactory diamond grinding shall be required. Grinding or milling equipment shall be of a shape and dimension that does not encroach on traffic movement.

The Contractor shall check the pavement for smoothness after grinding, in accordance with the requirements of this Subsection, and shall make any additional corrections necessary to the pavement to achieve smoothness. The Contractor shall submit a report and a graph chart showing compliance of the final surface to the smoothness requirements.

The cost of such grinding or milling, and all related work such as fog coat, disposal of milled material, traffic control, flagging, profiling, surface repair of ground or milled areas, and temporary pavement markings shall be at the Contractor expense.

ON PAGE 200-202, SUBSECTION 405.05- BASIS OF PAYMENT *

Delete everything after the second paragraph and substitute the following:

For each evaluation section the Contractor is entitled to an incentive payment excluding acceptance test strips and Schedule III surface smoothness projects. An evaluation section is defined as a 0.1 mile (100m) per traffic lane; or fraction thereof as applicable. The incentive payment will not be paid for pavement on the roadway shoulders, center turn lanes, turn bays, crossovers, tapers or other miscellaneous pavement. The incentive payment will be paid in accordance with the following schedule:

International Roughness Index

English Schedule

Payment	**Initial Index in/0.1 mile section**	
$ per 0.1 mi.	**Schedule I**	**Schedule II**
$500	4.0 or less	4.5 or less
$300	4.1 to 5.0	4.6 to 6.0
$100	5.1 to 6.0	6.1 to 7.0
$ 0	6.1 to 7.0	7.1 to 8.0
-$100	7.1 to 7.5	8.1 to 8.5
-$300	7.6 to 8.5	8.60 to 9.5
-$500	8.6 to 9.5	
-$300 and corrective action	9.6 or greater	9.6 or greater
-$300 and corrective action	individual high points	individual high points

Metric Schedule

Payment	**Initial Index mm/100m section**	
$ per 100m	**Schedule I**	**Schedule II**
$310	63.0 or less	71.0 or less
$190	63.1 to 79.0	71.1 to 95.0
$60	79.1 to 95.0	95.1 to 110.0
$ 0	95.1 to 110.0	110.1 to 125.0
-$60	110.1 to 120.0	125.1 to 135.0
-$190	120.1 to 135.0	135.1 to 150.0
-$310	135.1 to 150.0	
-$190 and corrective action	150.1 or greater	150.1 or greater
-$190 and corrective action	individual high points	individual high points

Only one incentive payment will be made per evaluation section. The evaluation sections shall run consecutively from the point paving begins to the point paving is interrupted as shown on the plans

such as at bridges, the end of lane paving or areas specifically excluded by the specifications. Any partial section will be prorated based on it's percentage of a full section.

Incentives will be based on initial profiles prior to any corrective work on the top course of paving.

ON PAGE 208, SUBSECTION 408.03- CONSTRUCTION REQUIREMENTS

Add the following after the fourth paragraph of Part B:

Fog coat shall be applied in the same diretion as traffic travels upon the roadway.

ON PAGE 215, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS

Add the following before the first full sentence: *

The "final set" time shall be submitted with the mix design. Final Set shall be measured by AASHTO T 197M / T 197.

Add the following to the third full paragraph:

> Testing may be performed on the coarse and fine aggregates together or separately. If testing is performed on the coarse and fine aggregates together the blend percentage must be reported on the test and be within plus or minus 2 percent of the blend percentage used in the mix design. When tested separetely, mitigation shall be based on the aggregate requiring the most mitigation.

Add the following after the sixth full paragraph:

> Fly ash, if used in the concrete mix for ASR mitigation, shall not have a CaO content more than 2 percent above the CaO content of the fly ash used for AASHTO T303 testing. If the fly ash has a CaO content greater than 2 percent above the fly ash used for testing, additional AASHTO T303 at the higher CaO content shall be required.
>
> If fly ash is used only as a mineral admixture, the dosage of lithium nitrate shall be calculated based on AASHTO T303 testing without fly ash.

ON PAGE 222, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS

Delete Part 10 and substitute the following:

10. The Contractor shall furnish concrete that will have a temperature of at least 50 F (10 C) and not more than 85 F (29 C) at the time of placing.

Delete the first sentence of Part F and substitute the following:

F. Temperature Limitations and cutoff Dates. Concrete pavement may be placed between May 1 and October 1 with the following precautions: When concreting is authorized during cold weather, the temperature of the mixed concrete shall be not less than 50 F (10 C) and not more than 85 F (29 C) at the time of placing.

Delete the first sentence of the second paragraph of Part F and substitute the following:

> The temperature of the concrete shall not exceed 85 F (29 C) at time of placement.

ON PAGE 239, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS *

Add the following to part 1:

In lieu of test specimens to determine compressive strengths, maturity testing may be used in accordance with ASTM C1074.

The Contractor shall develop the maturity-strength relationship and provide maturity curves along with supporting data and field procedures for monitoring maturity for approval at least 10 days prior to use. The Contractor shall furnish all equipment, including thermo or maturity meters, thermocouples, wire and qualified personnel to monitor maturity and provide information to the Engineer.

ON PAGE 240, SUBSECTION 409.03- CONSTRUCTION REQUIREMENTS

Delete the text of Part Q and substitute the following:

Full use of the pavement by all classes of traffic will not be permitted until field cured test specimens have attained a compressive strength of not less than 3500 psi (24 MPa). The pavement shall be cleaned before opening to traffic. In lieu of test specimens to determine compressive strengths, maturity testing * may be used in accordance with ASTM C1074. The Contractor shall develop the maturity-strength relationship and provide maturity curves along with supporting data and field procedures for monitoring maturity for approval at least 10 days prior to use. The Contractor shall furnish all equipment, including thermo or maturity meters, thermocouples, wire and qualified personnel to monitor maturity and provide information to the Engineer.

ON PAGE 244, SUBSECTION 411.02- MATERIALS

Add "409.01 and" in the first paragraph after the word "Subsection".

ON PAGE 244, SUBSECTION 411.03- CONSTRUCTION REQUIREMENTS

Add "409.01 and" in the first paragraph after the word "Subsection".

ON PAGE 249, SUBSECTION 411.03- CONSTRUCTION REQUIREMENTS

Add the following to Part H.4:

5. Tie bars. Tie bars shall conform with Subsection 409.03 3. Tie Bars.
6. Load Transfer Devices. Load transfer devices shall conform with Subsection 409.03 4. Load Transfer Devices.

ON PAGE 251, SUBSECTION 411.03- CONSTRUCTION REQUIREMENTS

Delete the first paragraph and substitute the following:

O. *Opening Pavement to Traffic*. Full use of the pavement by all classes of traffic will not be permitted until field cured test specimens have attained a compressive strength of not less than 3500 psi (24 MPa). In lieu of test specimens to determine compressive strengths, maturity testing may be used in * accordance with ASTM C1074. The Contractor shall develop the maturity-strength relationship and provide maturity curves along with supporting data and field procedures for monitoring maturity for approval at least 10 days prior to use. The Contractor shall furnish all equipment, including thermo or maturity meters, thermocouples, wire and qualified personnel to monitor maturity and provide information to the Engineer.

ON PAGE 253, SUBSECTION 412.02- MATERIALS

Add to the first paragraph: *

When sampling from truck transports, the Contractor shall provide an adequate platform at the mixing plant to enable samples to be obtained in accordance with WAQTC FOP for AASHTO T 168.

Add the following at the beginning of the third paragraph:

All plant mix seal designs shall use a minimum on one-half percent (1/2%) approved anti-stripping additive by weight of asphalt.

ON PAGE 254, SUBSECTION 412.03- CONSTRUCTION REQUIREMENTS

Delete in Part E the words "Part E" and substitute "Part A".

Delete in Part G the words "Part H" and substitute "Part I".

Delete in Part H the words "Part I" and substitute "Part B".

Delete in Part I the words "Part J" and substitute "Part K".

ON PAGE 257, SUBSECTION 501.02- MATERIALS

Delete the text of this subsection and substitute the following:

Not specified.

ON PAGE 262, SUBSECTION 502.01- DESCRIPTION

Add the following to Part A:

> Except when used in structural foundation and bridge applications, Class 22 (15.0), class 15 (10.5) and Seal Concrete do not require AASHTO T 303 mitigation testing as part of the mix design and do not require the use of ASR mitigation measures.

ON PAGE 265, SUBSECTION 502.01- DESCRIPTION

Delete the last sentence and substitute the following:

Manufacturers furnishing precast concrete products shall hold current certification under the NPCA Plant Certification Program or PCAA Plant Certification Program. Subcontractors holding current PCI plant certification per Section 506 are exempt from NPCA or PCAA plant certification requirements.

ON PAGE 267, SUBSECTION 502.02- MATERIALS

Add after the second test method “WAQTC TM-2”:

> When concrete is delivered by means of a concrete pump, samples shall be obtained at the final point of placement (discharge pipe).
>
> The Contractor shall provide a safe and accessible platform for sampling the fresh concrete in close proximity and elevation to the final point of placement.

ON PAGE 267, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS *

Add after the third sentence:

The "final set" time shall be submitted with the mix design. Final set shall be measured by AASHTO T 197M / T 197.

ON PAGE 268, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete the last partial paragraph.

ON PAGE 269, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete the first partial paragraph and substitute the following after the table.

> Laboratory specimens, produced in accordance with AASHTO T 303, shall be required using the cement, fly ash, and other mitigative additives proposed for use in the mix design. Expansion of mortar bars shall not exceed 0.10 percent with the addition of fly ash, lithium, or other additives. Testing may be performed on the coarse and fine aggregates together or separately. If testing is performed on the coarse and fine aggregates together the blend percentage must be reported on the test and be within plus or minus 2 percent of the blend percentage used in the mix design. When tested separetely, mitigation shall be based on the aggregate requiring the most mitigation.

Add the following after the second full paragraph:

Fly ash, if used in the concrete mix for ASR mitigation, shall not have a CaO content more than 2 percent above the CaO content of the fly ash used for AASHTO T303 testing. If the fly ash has a CaO content greater than 2 percent above the fly ash used for testing, additional AASHTO T303 at the higher CaO content shall be required.

If fly ash is used only as a mineral admixture, the dosage of lithium nitrate shall be calculated based on AASHTO T303 testing without fly ash.

ON PAGE 271, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS *

Add after the second paragraph of Part C:

The contractor/supplier shall prepare a batch ticket for each batch of concrete delivered to the project. The ticket shall be a form acceptable. The ticket at a minimum shall indicate the project name, project number, supplier name, mix design number, date and time batched, load number, truck number, percent moisture in aggregate, volume batched, and the weight measurement of each of the individual components of the mix added to the batch. The Contractor shall supply all labor necessary to prepare batch tickets as required. The batch ticket shall be delivered to the Engineer at the point of discharge before incorporating the concrete into the work.

ON PAGE 275, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete from the last sentence of the first Paragraph of Part 1 "an Engineer registered in the State of Idaho" and substitute "a Professional Engineer licensed in the State of Idaho".

ON PAGE 277, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Add the following after Part 3a.

(5) Falsework and Forms Supporting Concrete Work on Steel Structures.

a. Loading of Girder Webs: Falsework and forms supporting the concrete work on steel structures shall be constructed so that any loads applied to girder webs shall be applied within 6" (150mm) of a flange or stiffener and shall be distributed in a manner that will not produce local distortion of the web.

b. Lateral Loading of Girder Flanges: Temporary struts and ties shall be provided as necessary to resist lateral loads applied to the girder flanges and to prevent appreciable relative vertical movement (0.2" (5mm) maximum) between the edge of deck form and the adjacent steel girder.

(6) Add the following procedure for determining the lateral pressure of fluid concrete when pozzolans or admixtures are used in the concrete mix:

For concrete made with pozzolans or admixtures and placed with normal internal vibration to a depth of 4 ft. or less, formwork can be designed for a lateral pressure as follows:

p = lateral pressure, psf
R = rate of placement, ft./hr.
T = temperature of concrete during placing, deg F
Cc = chemistry coefficient;
1.2 for cement type I and III with a retarder*
1.2 for blends containing fly ash without a retarder*
1.4 for blends containing fly ash with a retarder*

* retarders include any admixture that delays setting of concrete

For columns:

$$p = Cc\ [\ 150 + 9000\ R / T\ ]$$

with a maximum of (3000)(Cc) psf, a minimum of 600 psf, but in no case greater than wh.

For walls:

$$p = Cc\ [\ 150 + 43{,}400 / T + 2800\ R / T\ ]$$

with a maximum of (2000)(Cc) psf, a minimum of 600 psf, but in no case greater than wh.

For the purpose of applying the pressure formulas, columns are defined as elements with no plan dimension exceeding 6.5 feet. Walls are defined as vertical elements with at least one plan dimension greater than 6.5 feet.

**This specification is a modification of ACI Manual of Concrete Practice Part 4, 2004 Subsection 2.2.2, Lateral pressure of concrete.

<u>ON PAGE 284, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS</u> *

Add the following after the second paragraph:

In lieu of test cylinders to determine compressive strengths for form removal and loading, maturity testing may be used in accordance with ASTM C1074. The Contractor shall develop the maturity-strength relationship and provide maturity curves along with supporting data and field procedures for monitoring maturity for approval at least 10 days prior to use. The Contractor shall furnish all equipment, including thermo or maturity meters, thermocouples, wire and qualified personnel to monitor maturity and provide information to the Engineer. Maturity testing shall represent the concrete in the most unfavorable field conditions.

ON PAGE 285, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete from the Table, Part 2b and substitute the following:

b. Approach slabs, and bottom slabs of box girders (with falsework in place).

ON PAGE 296, SUBSECTION 502.03- CONSTRUCTION REQUIREMENTS

Delete "approach slabs" from the second paragraph of Part A. Water Cure.

ON PAGE 310, SUBSECTION 504.01- DESCRIPTION

Delete the first sentence of Part H and substitute the following:

The Contractor shall submit the proposed plan for erection to the Engineer for approval.

Delete the next to last sentence of the second paragraph of Part H and substitute the following:

The calculation and plan shall be stamped by a Professional Engineer licensed in the State of Idaho.

Delete the third full paragraph.

ON PAGE 311, SUBSECTION 504.02- MATERIALS *

Delete “AASHTO M270 Grade 485” and substitute “AASHTO M270 Grade 70W”

ON PAGE 314, SUBSECTION 504.03- CONSTRUCTION REQUIREMENTS *

In the second paragraph of Part B change “250 m in (6 mm)” to “250 micro-inches (6 micro-meters)”.

In the third paragraph of Part B change “1000 m in (25 mm)” to “1000 micro-inches (25 micro-meters)”.

ON PAGE 319, SUBSECTION 504.03- CONSTRUCTION REQUIREMENTS *

Delete “twist” from the first sentence of the first paragraph of Part 3.

ON PAGE 322, SUBSECTION 504.03- CONSTRUCTION REQUIREMENTS *

Delete the last sentence of the first paragraph of Part L1 and substitute the following:

Direct tension indicators shall be type 3 weathering steel.

ON PAGE 331, SUBSECTION 504.03- CONSTRUCTION REQUIREMENTS *

In the sixth sentence of the last paragraph of Part 3 change “dye-penetrate method” to “magnetic-particle test (yoke method)”.

ON PAGE 332, SUBSECTION 504.03- CONSTRUCTION REQUIREMENTS *

Delete the word "shop" from the first sentence of Part 5.

ON PAGE 338, SUBSECTION 505.03- CONSTRUCTION REQUIREMENTS

Add the following after the first sentence of the second paragraph:

> The Contractor shall notify the Engineer a minimum of seven (7) calendar days prior to driving each test pile. The Engineer will require two (2) working days after each test pile is driven to evaluate each test pile result and determine the required pile length.

ON PAGE 345, SUBSECTION 506.02- MATERIALS *

Add the following:

Any member that contains failing strand or steel shall be rejected."

ON PAGE 380, SUBSECTION 512.01- DESCRIPTION

Delete from the second sentence of Part A “registered” and substitute "licensed".

ON PAGE 392-393, SECTION 606 – PIPE UNDERDRAIN *

Delete this section and substitute the following:

SECTION 606 PIPE UNDERDRAINS, URBAN EDGE DRAINS, AND RURAL EDGE DRAINS

606.01 Description. This work shall consist of furnishing, placing, and inspecting pipe underdrains, rural edge drains and urban edge drain pipes in accordance with these specifications and in reasonably close conformity with the plans or as directed.

606.02 Materials. Materials shall meet the following requirements:

Drain Rock will meet all applicable requirements of Section 703.03 – Coarse Aggregate for Concrete. Specifically, Drain Rock shall comply with the gradation requirements of Coarse Aggregate size 1, 2a, or 2b. Drain rock shall be clean angular quarried or crushed rock free of clay, lumps, and friable particles.

Subgrade Separation Geotextile, Type III……718.07
Corrugated Polyethylene Drainage Tubing,
Perforated and Unperforated……706.10
Fittings for Polyethylene Drainage Tubing……...ASTM F405
Grout (mortar)……....506.03, Type D
Metallic Coated Corrugated Steel Underdrains……706.07
Corrugated Aluminum Pipe for Underdrains……706.08
PVC pipe, Perforated and Unperforated……706.14
Corrugated Steel Pipe, Metallic Coated,
For Sewers and Drains……..AASHTO M36
Rodent Protection Devices for Trench Drain……ASTM F449

Edge Drain Markers……..702.10

Drain Rock will be accepted by certification using form ITD-851. The Contractor shall submit quality control test results for each 500 Tons of Drain Rock placed, with a minimum of one test per project, including gradation (AASHTO T-27 with no wash required) and sand equivalent (AASHTO T-176) test results to verify the certification. The quality control sampling and testing shall be performed by a qualified independent laboratory and shall be submitted to the Engineer. The material shall conform to one of the specified coarse aggregate gradations for acceptance.

Grout (mortar) shall consist of a product on the Department's Qualified Products List or the Contractor's proposed mix design and shall be approved prior to use. The supplier shall furnish a completed certification form ITD-851, Miscellaneous Items.

606.03 Construction Requirements.

General. Perforated pipe shall be laid with the perforations down, unless otherwise directed. The excavation shall be lined with Geotextile as shown on the plans. Drain Rock shall be placed around and to the elevation over the pipe as shown in the plans. Geotextile shall be folded over the drain rock and overlapped a minimum of 2 ft on the top and at the drain ends. When shown on the plans, approved backfill material shall be placed to the top of the trench and compacted as directed.

Geotextile, drainage pipe or tubing, and aggregate backfill shall be installed at the locations shown in the plans or as determined.

Materials placed over Pipe Underdrains, Urban Edge Drains, and Rural edge drains shall be as shown in the plans.

Urban Edge Drains. Locations of Urban Edge Drains shall be field verified with a State Inspector present and approved.

At locations where a storm sewer exists or is to be constructed, the following shall apply. The edge drains shall be placed on the low side of the roadway, unless otherwise specified. Edge drains shall be constructed to discharge into storm sewer catch basins as indicated on the plans. Edge drain inlets shall be capped in storm sewer catch basins and their outlet pipes shall drain to a storm sewer catch basin. The edge drain slope shall follow the grade of the roadway except where side street grades will not allow it. Side street edge drains shall be sloped in the direction shown on the plans or as directed. Where the plans show edge drain pipe connecting to storm sewer catch basins, the connection shall be made by coring the concrete wall of the catch basin , placing the end of the edge drain pipe in line with the inside wall of the catch basin. The gap between the edge drain and the concrete wall of the catch basin shall be sealed with grout (mortar) in such a manner as to ensure a strong watertight connection.

Rural Edge Drains and Pipe Underdrains. Excavation for the Rural Edge Drains and Pipe Underdrains shall conform to the requirements of Section 210.

Rodent Protection Devices for Outlet Pipes shall be witnessed by edge drain markers conforming to the requirements of Standard Drawing G-3 Delineators, Type 4R or 4F, and shall bear the letters UD. White reflective sheeting shall be used.

The outlet pipes shall be placed in 10 foot long corrugated steel pipe sleeves extending from the rodent protectors as shown on the plans. The diameter of the corrugated steel pipes shall be just large enough to allow the outlet pipes to fit through.

The maximum depth of trench excavation for Pipe Underdrains shall be 5 feet.

Drain Rock. Drain Rock shall be placed within specified areas as shown on the plans, typical sections, and details.

Inspection. Prior to final acceptance of the project, the Contractor shall prove to the Engineer that the drains and outlet pipes are in good condition and have not been damaged in any way by any activities that have occurred during or after installation of the drains. The Contractor shall use video inspection equipment to provide proof of the condition of the drains and shall provide the Engineer with copies of the video tapes. The Contractor shall notify the Engineer at least 24 hours in advance of the video inspection so that a State inspector may witness the videotaping. The video inspection equipment shall be capable of superimposing the date, time, and location on the picture at the time of inspection. If the video inspection shows any damage to the system, these areas will be repaired by the contractor at no cost to the State.

606.04 Method of Measurement. Pipe Underdrains will be measured by the foot complete in place. Urban Edge drains will be measured by the foot complete in place. Rural Edge Drains will be measured per foot complete in place.

606.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	**Pay Unit**
Pipe Underdrain…….	Ft (m)
Urban Edge Drain……..	Ft (m)
Rural Edge Drain……...	Ft (m)

Concrete coring, grout (mortar), or any other items necessary to complete the installation will not be paid for separately and will be included in the Urban Edge Drain item.

Video inspection will not be paid for separately but will be included in the item.

Materials placed over Pipe Underdrains, Urban Edge Drains, and Rural Edge Drains will be paid for in accordance with the plans and under their respective items.

ON PAGE 396, SUBSECTION 609.05- BASIS OF PAYMENT *

Delete first pay item and substitute the following:

Concrete……CY(m^3)

ON PAGE 398, SUBSECTION 610.03- CONSTRUCTION REQUIREMENTS

Delete the first, third, fifth, and seventh paragraphs.

ON PAGE 399, SUBSECTION 610.03- CONSTRUCTION REQUIREMENTS

Delete last two paragraphs.

ON PAGE 399, SUBSECTION 610.05- BASIS OF PAYMENT

Add the following:

When barbarm/security attachment for Type 4 fence is called for on the plans, no separate payment will be made and all work associated with attachments shall be incidental to the cost of the fence.

ON PAGE 401, SUBSECTION 612.02- MATERIALS

Delete the material requirement for Posts…710.03 and substitute the following:

Wood Guardrail Posts and Wood Spacer Blocks ……710.03
Steel Guardrail Posts……708.07

ON PAGE 406, SUBSECTION 615.03- CONSTRUCTION REQUIREMENTS

Delete from the second paragraph "9.84 ft. (3 m)", substitute "10 ft. (3 m)".

Delete from the second paragraph "3.28 ft. (1 m)", substitute "3 ft. (1 m)".

ON PAGE 407, SUBSECTION 615.03- CONSTRUCTION REQUIREMENTS

Delete from the first sentence of the third paragraph of part 2 "(3 m)" and substitute "(2.7 m)".

Delete from the last sentence of the third paragraph of part 2 "590.55 ft." and substitute "600 ft."

ON PAGE 411, SUBSECTION 616.03- CONSTRUCTION REQUIREMENTS

Add the following after the first sentence:

The design parameters for signs shall conform to the following requirements:

Overhead Sign Bridges
- Design Life – 50 years
- Design Wind Speed – 90 mph
- Fatigue Category – (not required)

Overhead Cantilever Sign Structures
- Design Life – 50 years
- Design Wind Speed – 90 mph
- Fatigue Category – I (Fatigue design shall include natural wind gust; periodic galloping forces; and truck- induced gust loads based on a truck speed of 65 mph.)

All other Sign Supports
- Design Life – 25 years
- Design Wind Speed – 90 mph
- Fatigue Category – (not required)

Delete from the second sentence of the first Paragraph "an Engineer registered in the state of Idaho" and substitute "a Professional Engineer licensed in the State of Idaho".

Add "Professional" in the last sentence of the first paragraph after "said ".

ON PAGE 412, SUBSECTION 616.03- CONSTRUCTION REQUIREMENTS

Add to the second full paragraph, "if approved".

Delete the last sentence of the third full paragraph.

Add after the fifth full paragraph:

Anchors bolts shall be installed plumb plus or minus one degree. The double nuts shall be installed individually and tightened snug tight. "Snug tight" means either the tightness reached by (1) a few blows from an impact wrench, or (2) the full effort of a man using a spud wrench. At least three threads of the anchor bolt shall be visible above the second nut.

High strength structural bolts shall be tightened in accordance with Subsection 504.03.L.2

ON PAGE 421, SUBSECTION 619.03- CONSTRUCTION REQUIREMENTS

Add after the 10th paragraph:

Anchor base assemblies shall have double nuts and be individually tightened snug tight. "Snug tight" means either the tightness reached by (1) a few blows from an impact wrench, or (2) the full effort of a man using a spud wrench. At least three threads of the anchor bolt shall be visible above the second nut.

ON PAGE 422, SUBSECTION 619.03- CONSTRUCTION REQUIREMENTS

Delete the first and second sentences in the first paragraph and substitute the following:

The support coupling device installation shall be in accordance with manufacturer recommendations.

ON PAGE 423-425, SUBSECTION 620.03- CONSTRUCTION REQUIREMENTS

Delete this subsection and substitute the following:

620.03 Construction Requirements. The Contractor is responsible for adequate and proper care of all plant material. Adequate and proper care includes but is not limited to keeping all plant materials in a healthy, growing condition by appropriate handling, storing, watering, cultivating, pruning and spraying.

Unless otherwise approved, planting operations shall be performed between September 15 and May 15, and shall take advantage of favorable planting conditions. Bare root plants shall be planted before the leaves open or new needles have started forming. If the Contractor is permitted to plant at other seasons, approved organic wetting agents or anti-transpirants shall be applied in accordance with manufacturer recommendations. No wetting agents or anti transpirants shall be applied after April 15.

All soil, discarded branches, rejected plants or other debris, twine, rope, transit guards, or wrappings shall be promptly cleaned up and disposed of.

Irrigated or sodded area(s) to be planted shall be graded and/or leveled prior to staking or marking planting locations. Natural or unmaintained area(s) shall be disked or left in a roughened condition prior to staking planting locations. Tree locations and the general layouts of planting areas for shrubs, vines, and ground cover shall be marked out and staked by the Contractor. Planting shall not begin until the area(s), tree locations and general layouts of the planting site(s) have been approved.

Planting areas for shrubs and vines shall be cultivated to a minimum depth of 4 in. (100 mm). Weeds and other vegetative growth, large clods, rocks, and other debris encountered in the cultivating work shall be removed and disposed of.

When excavating holes for planting, topsoil shall be kept separate from subsoil and shall be made loose and friable. Soils containing a pH greater than 8, a pH less than 4, gravel, stones, or other detrimental material encountered in the excavation shall be removed and disposed of. A soil auger may be used as approved by the Engineer. Excavated planting holes that are left open when the work is not in progress shall be adequately barricaded with appropriate warning devices. Glazed surfaces inside planting holes shall be sufficiently roughened prior to backfilling.

For containerized plants, soil conditioner shall be mixed into 6 in. (150 mm) of loose topsoil in the bottom of planting holes, but shall not be mixed with the soil to be used in backfilling. The quantities to be used will be approximately 1 CF (0.03 m^3) per tree, and 0.5 CF (0.015 m^3) per shrub or vine or as directed.
Plants shall be removed from plastic, metal, or biodegradable containers prior to planting. Care shall be taken to prevent disturbance of the root systems or earth therein. Bare-root plants shall have their roots spread out in a natural position, free of bunching kinking or circling

All holes and cavities between plantings and the surrounding soil shall be filled. In their final position, the plants shall be planted to the root collar depth, or when applicable at the same depth to the finished grade as when growing in the nursery or container. Planting areas shall be finish-graded to conform to drawings after the soil has settled. After planting is completed, the soil surface shall be cultivated to a depth of not less than 2 in. (50 mm).

Commercial fertilizer shall be incorporated uniformly in the surface of the soil around trees and shrubs in the amounts directed. The quantities to be used will be approximately 1 lb. (0.5 kg) per tree, and 0.5 lb. (0.25 kg) per shrub or vine or in amounts as directed.

Mulching of planted areas shall be performed after all planting work in each area is complete and the ground is smooth and clean. Mulch shall be placed with a 3-4 inch (75-100 mm) layer of wood chips or small bark over the entire shrub and vine root system and around trees immediately after planting as shown on the plans.

Mulch shall be removed from plants, structures, roadway areas and grassed areas not specified to be covered.

Select topsoil shall meet the requirements of Subsection 711.09; shall be made loose and friable; and shall be applied in accordance with the plans or as directed.

Trees, shrubs, vines and ground cover shall be thoroughly watered during or immediately after planting. Watering shall be repeated as often as necessary until the work is accepted. The Contractor shall exercise care to prevent puddled soil conditions and avoid compaction around the plants after watering.

Water may be obtained without charge from state-owned or state-controlled water supply systems on the project, if such exist; otherwise water shall be obtained by the Contractor at no expense to the state.

All trees and shrubs shall be pruned at the time of planting to remove broken or damaged twigs, branches or roots and such a manner as to retain or to encourage natural growth characteristics to the plants. Cut surfaces 1 in. (25 mm) or more in diameter shall be painted immediately with an approved tree wound dressing.

The Contractor shall assure the establishment of plantings by watering, cultivating, replacement of plants or mulch, and other work necessary to maintain the plants in a healthy condition, throughout the plant establishment period of one year or as designated in the special provisions.

If the Contractor elects to use a herbicide to control weeds, it shall be the Contractor's responsibility to replace and maintain plants and lawn damaged by its use.

At completion of the original planting, the Engineer shall perform an inspection with the Contractor of all plant material to note and correct any discrepancies. Dead plants shall be removed and replaced. Plants which do not show expected growth, but which retain green leaves, stems, or buds may be left in place, subject to acceptance or rejection during the plant establishment period.

After the original planting the Engineer will periodically inspect the condition of plants and planting areas. The Engineer will notify the Contractor of apparent defects, faults and conditions, and dead plants discovered by the inspection. Correction of apparent defects, faults and conditions, and the removal and disposal of dead plants shall be completed within 10 days after notification or as directed.

If immediate replacement of dead or rejected plants is impossible due to seasonal conditions or the lack of specified plants, a marker shall be placed at the spot of replacement and replacement shall be made in the next planting season. A plant establishment period of six months shall apply to replacement plants. The Contractor shall assure the establishment of the new plantings in accordance with all applicable contract requirements.

In the event of infestation by insects or disease, plants shall be treated by effective remedial measures approved as good horticultural practice.

ON PAGE 427, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS

Delete the 4th full paragraph – "If seeding is the only remaining work……"

Add the following to the 1st paragraph of part B:

All chemicals for treating weeds shall be applied in accordance with manufacturer recommendations. Chemicals for treating weeds shall be applied at least one month prior to seeding.

ON PAGE 428, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS

Delete the 2nd sentence of the 2nd full paragraph and substitute the following:

If conditions occur that prevent seeding at specified furrow depths, or if the roughened condition is destroyed, the Contractor shall prepare the seedbed again"

Delete the 3rd and 4th sentences of the 2nd paragraph of Part C: "Fertilizer shall be certified…..".

Add the following to the 1st paragraph of part D:

All native/shrub and/or forb species shall be applied separately from grass species. If seed is applied using broadcast seeding, the soil shall be raked prior to applying seed and/or mulch mixture.

Delete the 1st and 2nd sentences of the 2nd paragraph of part D.

ON PAGE 429, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS

Delete the 1st full paragraph and substitute the following:

When drill seeding, without using mulch, place seed at the bottom of approximately 1 in. (25 mm) depth furrows (furrows set according to size and dimension of seed) shaped by the double disc openers. Drill rows shall be set to a depth of 1 in (25 mm) or less according to size and dimension of seed. The speed and spring pressure of the drills shall be regulated so ½ in. (12 mm) of soil covers the seed and the furrows are left open. Drag chains will not be allowed.

For drill seeding applications, soil conditioner shall be applied prior to seeding and lightly incorporated into the soil wherever possible.

Delete the 2nd and 5th sentences of the 2nd full paragraph and substitute the following:

Seeding applications shall not be performed when wind interferes with seed placement. Native seeds in the mix shall be broadcast immediately ahead of the drill or be seeded separately.

ON PAGE 430, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS

Delete the 2nd and 3rd sentences of Part 1 Mulching and substitute the following:

Hydro-mulch applications shall not be used on slopes flatter than 3:1 or in conjunction with drill seeding applications.

ON PAGE 431, SUBSECTION 621.03- CONSTRUCTION REQUIREMENTS

Page 431: Delete the 1st paragraph of Part 3 Erosion Blanket.

ON PAGE 433, SUBSECTION 622.02- MATERIALS

Delete the text of this subsection and substitute the following:

Materials shall meet the requirements of Section 502-Concrete and the plans.

ON PAGE 435-437, SECTION 624 - RIPRAP

Delete the text of this Section and substitute the following:

624.01 Description. The work for slope protection shall consist of furnishing and placing riprap protection of the type specified at the locations and in reasonably close conformity with the lines and dimensions shown on the plans or as established.

Riprap will be classified as loose riprap, hand placed riprap.

624.02 Materials. Material for riprap shall meet the requirements of the following Subsections:

Loose Riprap.....703 and 711.04

Hand Placed Riprap .....703 and 711.04

624.03 Construction Requirements. The toe trench for riprap shall be excavated below probable scour elevation or to the elevation shown on the plans. Where scour elevation cannot be determined and no elevation is shown on the plans, the trench shall be excavated 2 ft. (600 mm) below channel grade. No stone shall be laid or concrete placed until the toe trench and slopes are approved.

A. *Loose Riprap.* Loose riprap shall be placed so the larger stones are in contact with each other and the voids filled with the finer materials, producing a well graded compact mass. The stone shall be placed on the slope in a manner to ensure the specified thickness in one operation. When placing, care shall be used to avoid disturbing underlying material. Placing in layers parallel to the slope shall not be permitted.

B. *Hand Placed Riprap.* The stones shall be laid by hand on prepared slopes to the thickness specified or directed. The riprap shall be started by placing a course of the largest stones in the toe trench. Each stone shall be so placed that it shall rest partly on the prepared slope and not completely on the stone below and shall be thoroughly tamped or driven into place. The exposed face of all hand placed riprap shall be made as smooth as the shape and size of the stones will permit, and shall not vary more than 3 in. (75 mm) from a plane surface on the required slope.

624.04 Method of Measurement. Loose riprap or hand placed riprap will be measured by the Ton or CY (metric ton or cubic meter) of riprap.

Excavation of toe trenches below the level of the intersection of the slope to be riprapped and the adjacent final ground or channel floor shall be classified, measured and paid for as "structural excavation," in accordance with Section 210 - Structure Excavation and Compacting Backfill. All preparation of the slope to receive riprap above the level of the above described intersection shall be included in the contract price for the class of riprap to be placed.

624.05 Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Loose Riprap	Ton or CY (t or m^3)
Hand Placed Riprap	Ton or CY (t or m^3)

ON PAGE 438, SUBSECTION 625.02- MATERIALS

Add the following:

SiIicone Sealant……704.05

ON PAGE 438, SUBSECTION 625.03- CONSTRUCTION REQUIREMENTS

Add the following after the second paragraph:

Silicone Sealant shall be applied in accordance with the manufacturer's recommendations.

ON PAGE 439, SUBSECTION 626.02- MATERIALS

Delete the first sentence of the third paragraph and substitute the following:

"Pavement marking tape shall be 4 in. (100mm) wide retroreflective pressure sensitive tape manufactured for use as pavement markings suitable for use on either concrete or asphalt surfaces.

Delete from the fourth sentence of the third paragraph the words "striping materials" and substitute "pavement marking tape".

Delete from the first sentence of the fourth paragraph the words "striping material" and substitute "pavement marking tape".

ON PAGE 440, SUBSECTION 626.02- MATERIALS

Add the following after the first partial paragraph:

Temporary rigid raised pavement markers, non-snow-plowable, shall be suitable for use on either concrete or asphalt surfaces as required and shall be made of high impact durable material that will not deflect or deform under tire impacts. Markers shall be yellow for two-way centerline applications and shall have a bi-direction retro-reflective configuration. Markers shall be either yellow or white as required for edge line applications and shall have a mono-directional retro-reflective configuration. Markers shall be white for one-way lane separation applications and shall have a bi-directional retro-reflective configuration. Markers shall not have studs or mechanical attachments. Markers shall be a nominal 4-inch (100 mm) outside dimension, with a minimum installed height of 0.75-inch (18 mm), as

shown on the plans or as directed. The reflective surface area shall be a minimum of one inch square (625 mm^2). The specific intensity (SI) (candlepower/foot-candle) for each white retro-reflective surface at 0.2° observation angle shall be not less than the following when the incident light is parallel to the base of the marker in accordance with ASTM D 4280:

Horizontal Entrance Angle	S I
0 degrees	3.0
20 degrees	1.5

The specific intensity for each yellow marker surface shall be 60% of the value for white.

ON PAGE 441, SUBSECTION 626.03- CONSTRUCTION REQUIREMENTS

Delete the second full paragraph and substitute the following:

The Contractor shall, unless otherwise specified in the plans, be responsible for taking appropriate preventative measures and supplying and installing all supplemental devices necessary to ensure that all traffic control devices remain in place and serviceable during the period of time in which their use is required. This requirement shall include, but not be limited to providing supplemental devices to ensure that portable sign stands, barricades, drums, tubular markers, and cones are not displaced from their intended use.

ON PAGE 442, SUBSECTION 626.03- CONSTRUCTION REQUIREMENTS

Add the following:

All temporary rigid raised pavement markers, non-snow-plowable, used as a supplement to pavement markings and placed in conjunction with tubular markers to temporarily mark lane separation lines between bi-directional traffic shall be placed as shown on the plans or as directed. Markers shall be fastened to the pavement by adhesion according to the manufacturer's recommendations so they will remain firm. Nailing will not be a satisfactory means of fastening markers to the pavement. Markers shall be protected from traffic until the adhesive has properly cured.

The Contractor shall visually inspect all installed markers at least twice daily and shall replace any lost, damaged or displaced markers that day. Markers shall be removable from asphalt and concrete pavements, either manually or by mechanical devices, without the use of heat, grinding or blasting.

ON PAGE 443, SUBSECTION 626.04- METHOD OF MEASUREMENT

Add the following after the second full paragraph:

The hours for Traffic Control Maintenance work shall be documented daily upon duplicate report sheets furnished by the Engineer. These reports will be agreed upon weekly and signed by both parties.

Add the following:

Temporary rigid raised pavement markers, non-snow-plowable, will be measure by each installed, complete in place.

ON PAGE 444, SUBSECTION 626.05- BASIS OF PAYMENT

Add the following Pay Item:

Temporary Rigid Raised Pavement Marker, Non-Snow-Plowable……..Each

ON PAGE 453, SUBSECTION 630.04- METHOD OF MEASUREMENT

Add the following:

The hours for Flagging and Pilot Car Operation work shall be documented daily upon duplicate report sheets furnished by the Engineer. These reports will be agreed upon weekly and signed by both parties.

ON PAGE 458, SUBSECTION 634.02 – MATERIALS

Add the following:

The Type 1-A Mailbox Support - 4x4 Wooden Post shall conform to the requirements of Subsection 710.02 Wood Sign Posts and Snow Poles.

ON PAGE 458, SUBSECTION 634.04 – METHOD OF MEASUREMENT *

Add the following:

Mailbox snow shield will be measured by the number of shields constructed.

ON PAGE 458, SUBSECTION 634.05 – BASIS OF PAYMENT *

Add the following:

Mailbox Snow Shield……..Each

ON PAGE 466, SUBSECTION 656.02- MATERIALS

Add the following:

Nonstandard poles shall be designed in conformance with the following design parameters in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals:

Design Life – 50 years
Design Wind Speed – 90 mph
Fatigue Category – I (Fatigue design shall include natural wind gust; periodic galloping forces; and truck- induced gust loads based on a truck speed of 65 mph.)

ON PAGE 467, SUBSECTION 656.02- MATERIALS

Delete the second sentence of the fifth paragraph and substitute the following:

Each bolt shall be fitted with three nuts and two washers.

Delete from the second Part 1 "(300 m)" and substitute "(300 mm)".

Delete Part 7 and substitute the following:

7. Lamps shall be 130 volt, clear traffic signal lamps or approved L.E.D. module, with lumen rating and light center as specified by the Institute of Transportation Engineers.

Delete from Part 8 "(300 m)" and substitute "(300 mm)".

ON PAGE 468, SUBSECTION 656.02- MATERIALS

Delete the first paragraph and substitute "Pedestrian signal heads shall be one-way illuminated by incandescent traffic signal lamp contained in each section, or by L.E.D. module with the addition of the following:"

Delete from Part 6 "125 volt" and substitute "120 volt".

Delete the text of Part 7 after the word "furnished".

Add the following to the last paragraph: *

Unused conductors in cable assemblies shall be insulated, sealed against moisture, and tied back.

ON PAGE 474, SUBSECTION 701.01- GENERAL REQUIREMENTS

Add the following:

Limestone additions of up to 5.0% by mass of the cement shall be allowed providing that the chemical and physical requirements of the finished cement meet the specifications of AASHTO M85. The limestone shall be naturally occurring, consisting of at least 70% by mass of one or more of the mineral forms of calcium carbonate. The manufacturers Mill Test Report shall include the CaCO3 content of the limestone; the CO2 content and calculated limestone content of the cement. The limestone content in Portland Cement shall be derived as determined in ASTM C150 and tested by ASTM C114.

ON PAGE 476, SUBSECTION 702.03- EMULSIFIED ASPHALTS

Delete the third, fourth and fifth paragraphs and substitute the following:

Cationic emulsified asphalt shall meet the requirements of AASHTO M 208.

All grades of Rapid Setting Emulsion shall be homogenous after thorough mixing within 15 days after delivery.

Polymer Modified Cationic Emulsified Asphalts (CRS-2R and CRS-2L) shall be emulsified blend of asphalt, polymer, water, and emulsifiers.

CRS-2L emulsified asphalt shall meet the requirements of AASHTO M 316.

CRS-2R emulsified asphalt shall include asphalt cement thoroughly blended with a minimum of 1.5 percent total rubber solids. The emulsified asphalt shall conform to the following requirements:

ON PAGE 477, SUBSECTION 702.03- EMULSIFIED ASPHALTS *

Add the following:

STE-1 Special Tack Emulsion shall conform to the following:

	AASHTO TEST METHOD	SPECIFICATIONS MINIMUM	MAXIMUM
Tests on Emulsion:			
Viscosity @ 77°F (25°C) SFS	T59	----	30
Storage Stability, 1 day, %	T59	----	1
Demulsibility 35 ml. 0.8% sodium dioctyl sulfosuccinate*	T59	25	----
Particle Charge	T59	Positive	----
Sieve Test, %	T59	----	0.10
Distillation			
Oil distillate by volume of emulsion, %	T59	----	5
Residue, %	T59	45	----
Test on the residue from distillation			
Penetration 77°F (25°C)	T59	100	200
Ductility, 77°F (25°C) 5 cm/min., cm	T59	40	----
Solubility in Trichloroethylene, %	T59	97.5	----

*The demulsibility test shall be made within 30 days from date of shipment

ON PAGE 478 & 479, SUBSECTION 702.08- ASPHALT CERTIFICATION

Add to the first sentence "on a yearly basis".

Add to the first paragraph: *

… and all Emulsified Asphalts supplied to the project meet the requirements in Subsection 702.03.

Delete the second paragraph and substitute the following:

The supplier shall perform at least one complete set of quality control tests for each storage tank of polymerized product produced. Bulk tanks of non-polymerized binder shall be tested at least once every 21 calender days. A copy of each Certificate of Analysis (COA) shall be furnished to the Engineer.

ON PAGE 479, SUBSECTION 703.01- GENERAL REQUIREMENTS

Add to the first paragraph:

Values specified for the percent passing the #200 sieve shall have a ".0" added. (i.e. "3-9" shall be "3.0 - 9.0")

ON PAGE 481, SUBSECTION 703.02- FINE AGGREGATE FOR CONCRETE

Delete the second full paragraph and substitute the following:

The contractor shall perform AASHTO T 303, ASTM C1293 or ASTM C295 testing to determine the potential Alkali Silica Reactivity of the aggregates. Aggregates found to be potentially reactive per AASHTO T 303, ASTM C1293, or ASTM C295 shall require mitigating measures. Aggregates with

expansion greater than 0.10 percent as determined by AASHTO T 303, or greater than 0.04 percent as determined by ASTM C1293 will be considered potentially reactive. If ASTM C295 shows an aggregate composition containing greater than the indicated percentage for any of the following materials, the aggregate will be considered potentially reactive.

Mineral	Limit
Optically strained, microfractured, or microcrystalline quartz	5.0% (max)
Chert or chalcedony	3.0% (max)
Tridymite or cristobalite	1.0% (max)
Opal	0.5% (max)
Natural volcanic glass	3.0% (max)

ON PAGE 481, SUBSECTION 703.03- COARSE AGGREGATE FOR CONCRETE *

In the table under size no. 2a delete “95-100” passing the 3/4 in. screen and substitute “90-100”.

ON PAGE 482, SUBSECTION 703.03- COARSE AGGREGATE FOR CONCRETE

Delete the sixth full paragraph and substitute the following:

The contractor shall perform AASHTO T 303, ASTM C1293 or ASTM C295 testing to determine the potential Alkali Silica Reactivity of the aggregates. Aggregates found to be potentially reactive per AASHTO T 303, ASTM C1293, or ASTM C295 shall require mitigating measures. Aggregates with expansions greater than 0.10 percent as determined by AASHTO T 303 or greater than 0.04 percent as determined by ASTM C1293 will be considered potentially reactive. If ASTM C295 shows an aggregate composition containing greater than the indicated percentage for any of the following materials, the aggregate will be considered potentially reactive.

Mineral	Limit
Optically strained, microfractured, or microcrystalline quartz	5.0% (max)
Chert or chalcedony	3.0% (max)
Tridymite or cristobalite	1.0% (max)
Opal	0.5% (max)
Natural volcanic glass	3.0% (max)

ON PAGE 483, SUBSECTION 703.04- AGGREGATE FOR UNTREATED BASE, TREATED BASE AND ROAD MIX

Delete the Percent Passing the No. 30 Sieve Size for 3/4 in. A, and substitute “8-30”.

Add at the end of table:

The “B” gradation shall be used unless otherwise specified.

ON PAGE 483, SUBSECTION 703.05- AGGREGATE FOR PLANT MIX PAVEMENT

Add in the second sentence after "mix meets all" the words "other Class III requirements. Aggregate shall be crushed stone or".

ON PAGE 487, SUBSECTION 703.05- AGGREGATE FOR PLANT MIX PAVEMENT *

Delete from the last sentence of the fourth paragraph “weight in the course aggregate." and substitute "mass, on any individual coarse aggregate sieve."

ON PAGE 489, SUBSECTION 703.06- AGGREGATE FOR COVER COAT MATERIAL

Delete the table and subsequent paragraph and substitute the following:

Gradation Table

Sieve Size	Class A Urban	Class B Rural
	Percent Passing	
½ inch (12.5 mm)	100	100
3/8 inch (9.5 mm)	95 - 100	40 - 70
No. 4 (4.75 mm)	0 - 6	0 - 6
No. 8 (2.36 mm)	0 - 3	0 - 3
No. 200 (0.075 mm)	0 - 2.0	0 - 2.0

The aggregate for urban and rural cover coat material shall have a cleanness value of not less than 80.

ON PAGE 490, SUBSECTION 703.08- AGGREGATE FOR OPEN GRADED ROCK BASE (ROCK CAP)

Delete the last sentence and substitute the following:

The minimum sample size tested shall be 65 lb (30 kg).

ON PAGE 491, SUBSECTION 703.11- AGGREGATE FOR GRANULAR SUBBASE

Delete the last sentence and substitute the following:

The minimum sample size tested shall be 65 lb (30 kg).

ON PAGE 492, SUBSECTION 703.12- SAMPLING AND TESTING

Delete “ASTM D4791” and substitute the following:

Idaho Field Operating Procedures (FOP) of the Quality Assurance Manual for ASTM D 4791.

ON PAGE 494, SUBSECTION 704.02- JOINT SEALER FOR ASPHALT AND CONCRETE PAVEMENTS

Delete “ASTM D 3405” and substitute “ASTM D6690 Type II”

ON PAGE 495, SUBSECTION 704.05- SILICONE SEALANT

Delete the first sentence and substitute the following:

Low modulus silicone joint sealant material shall meet the requirements of ASTM D 5893.

ON PAGE 497, SUBSECTION 706.01- GENERAL REQUIREMENTS FOR CONCRETE PIPE

Delete "cement" from the first sentence.

Add the following:

Manufacturers furnishing concrete pipe must hold current certification under either the NPCA Plant Certification Program, the PCAA Plant Certification Program or the ACPA Q-Cast Plant Certification Program.

ON PAGE 506, SUBSECTION 708.06- STRUCTURAL STEEL AND RELATED MATERIALS

Delete the last paragraph and substitute the following:

The maximum tensile strength shall be 150 ksi (1035 MPa) for bolts 1 in. (25 mm) or less in diameter and 120 ksi (828 MPa) for larger bolts.

ON PAGE 514, SUBSECTION 708.06- STRUCTURAL STEEL AND RELATED MATERIAL *

Delete the first sentence of the last paragraph of Part 4.

ON PAGE 515, SUBSECTION 708.07- SUBSECTION NOT USED

Delete this Subsection and substitute the following:

708.07- Steel Guardrail Posts. W-beam and thrie-beam guardrail posts shall be manufactured using AASHTO M270M (ASTM A709B) Grade 250 steel unless corrosion resistant steel is required in which case the post shall be manufactured from AASHTO M270M (ASTM A709B) Grade 50W steel. The dimensions of the cross-section shall conform a W150x13.5 section as defined in AASHTO M160M (ASTM A6m). W150x12.6 wide flange posts are an acceptable alternative that is considered equivalent to the W150x13.5.

After the section is cut and all holes are drilled or punched the component shall be zinc-coated according to AASHTO M111 (ASTM A123) unless corrosion resistant steel is used. When corrosion resistant steel is used the portion of the post to be embedded in soil shall be zinc-coated according to AASHTO M111 (ASTM A123) and the portion above the soil shall not be zinc-coated, painted or otherwise treated.

ON PAGE 517, SUBSECTION 708.16- RIGID POSTS FOR DELINEATORS, SNOW POLES, AND MILEPOSTS OR KILOMETER POSTS

Delete the first paragraph and substitute the following:

Finished steel posts for delineators shall weigh a minimum of 1.12 lb./ft. (1.66 kg/m) and shall conform to ASTM A 702, Steel B; they shall be coated with a deep green, baked-on enamel finish.

Delete the second paragraph.

ON PAGE 518, SUBSECTION 708.16- RIGID POSTS FOR DELINEATORS, SNOW POLES, AND MILEPOSTS OR KILOMETER POSTS

Delete the information in the Table titled "CHAIN LINK POSTS AND BRACES" and substitute the following:

Fence Height		Pipe Section		C-Section (Class does not apply)	
		Min Size in. -od (mm o.d.)	**Min Weight lb./ft. (kg/m)**	**Min Size in. (mm)**	**Min Weight lb./ft. (kg/m)**
Line Posts					
6 ft. (1.8 m) or Less	Class 1	1.9 (48.3)	2.72 (4.0)	1.875 x 1.625 (48 x 41)	1.85 (2.7)
	Class 2	1.9 (48.3)	2.28 (3.4)		
8 ft. (2.4 m) or Less but > 6 ft. (1.8 m)	Class 1	2.375 (60)	3.65 (5.4)	1.875 x 1.625 (48 x 41)	2.28 (3.4)
	Class 2	2.375 (60)	3.09 (4.6)		
Corner and End Posts					
6 ft. (1.8 m) or Less	Class 1	2.375 (60)	3.65 (5.4)		
	Class 2	2.375 (60)	3.09 (4.6)		
8 ft. (2.4 m) or Less but > 6 ft. (1.8 m)	Class 1	2.875 (73)	5.79 (8.6)		
	Class 2	2.875 (73)	4.64 (6.9)		
Braces					
All Heights	Class 1	1.625 (41)	2.27 (3.4)	1.625 x 1.25 (41 x 32)	1.35 (2.0)
	Class 2	1.625 (41)	1.82 (2.7)		

Class 1 pipe lengths longer than those shown shall comply with the weights relative to min O.D. shown in ASTM F1083, Schedule 40. Interpolation of the weights shown in ASTM F1083 will be allowed.

Class 2 pipe lengths longer than those shown shall comply with the requirements for Class 1 adjusted per the formula below:

Wt_{C2}(lb./ft.) = 0.7574 x Wt_{C1}(lb./ft.) + 0.2814 (lb./ft.) OR Wt_{C2}(kg/m) = 0.7574 x Wt_{C1}(kg/m) + 0.2814(kg/m)

where Wt_{C2} =Weight (lb./ft.) required for Class 2 posts where Wt_{C2} =Weight (kg/m) required for Class 2 posts

Wt_{C1} =Weight (lb./ft.) required for Class 1 posts. Wt_{C1} =Weight (kg/m) required for Class 1 posts

<u>ON PAGE 519, SUBSECTION 708.17- STEEL AND ALUMINUM SIGN SUPPORTS</u>

Delete the last sentence in the third paragraph and substitute the following sentence:

"Anchor bolts, nuts, and washers shall conform to ASTM F 1554."

Delete the fifth paragraph.

Under the "Steel Structure List" Add "ASTM F 1554 (anchor bolts)"

ON PAGE 520, SUBSECTION 708.17- STEEL AND ALUMINUM SIGN SUPPORTS

Delete from the first sentence of the second paragraph of Part C the word "two" and substitute "three".

ON PAGE 522, SUBSECTION 708.19- ILLUMINATION POLES AND BASES

Delete from the second sentence of the first paragraph following the table of specifications the word "wind" and substitute "design".

ON PAGE 523, SUBSECTION 708.19- ILLUMINATION POLES AND BASES

Delete from the fourth and fifth paragraphs "structural and wind" and substitute "design".

ON PAGE 526, SUBSECTION 709.02- CONCRETE ADMIXTURES – GENERAL

Add the following:

Admixtures containing chlorides, flourides, sulphites, and nitrates shall not be used, except as below. *

ON PAGE 526, SUBSECTION 709.05- WATER REDUCING ADMIXTURES

Add the following:

709.06 Lithium Nitrate Admixtures. Lithium nitrate admixture shall consist of a 30% aqueous lithium nitrate solution. The lithium nitrate admixture used in the concrete shall be the same brand and from the same manufacturer as that reported in the mix design and used in the concrete alkali-silica reaction mitigation testing. Use shall follow all manufacturer's recommendations.

ON PAGE 527, SUBSECTION 710.02- WOOD SIGN POSTS AND SNOW POLES

Delete from the heading and throughout the subsection "and Snow poles".

ON PAGE 528, SUBSECTION 710.03- GUARDRAIL POSTS AND SPACER BLOCKS

Delete Title and 1st sentence and substitute:

710.03 Wood Guardrail Posts and Wood Spacer Blocks. Wood guardrail posts and wood spacer blocks shall be rough, S2S or S4S.

ON PAGE 530 & 531, SUBSECTION 710.09- PRESERVATIVE TREATMENT

Delete this subsection and substitute the following:

710.09 Preservative Treatment. All timber and lumber requiring preservative treatment shall be treated in accordance with the American Wood-Preservers' Association (AWPA) standards and specifications. These specifications include the following: storing and curing the timber and lumber, the wood preservatives, the preservative treatment process, documenting the results of the treatment, inspection, testing and the identification of properly treated timber. Unless otherwise specified in the contract, all timber and lumber shall be treated in accordance with Section C-14 of the latest addition of the AWPA standards.

All cutting, boring, chamfering, routing, surfacing, and trimming shall be done prior to treating. Any field drilling or cutoffs shall be treated by two liberal applications of a compatible preservative. The applications shall be in accordance with the requirements of AWPA Standard M-4.

All charges shall consist of pieces of the same species that are similar in form, size, moisture content, and receptivity of treatment. The pieces in the charge shall be separated to ensure contact of treating medium with all surfaces. The method of determining the retention of the preservatives shall be by assay.
The Certificate of Treatment shall include the following information:

Name and location of the wood preserving company
Customer identification
Date of treatment and charge number
Type of chemical used and the amount of retention by assay
Treating process and identification of the specifications used
Description of material that was treated
Signature of a responsible plant official

All timber and lumber to be used in aquatic environments, unless specified otherwise in the contract, shall be chemically treated using Best Management Practices (BMPs). The producer of the chemically treated products shall supply a written certification that the BMPs were utilized, including a description and appropriate documentation of the BMPs used. This information may be included with or on the Certificate of Treatment record.

Sign posts and fence posts shall be pressure treated with Ammoniacal Copper Zinc Arsenate (ACZA), Chromated Copper Arsenate (CCA), Copper Naphthenate or Pentachlorophenol in accordance with the latest version of American Wood Preservers Association Standards (AWPA) P5, P-8, P-9 and C-14, except:

The minimum retention of the preservative in the wood as determined by assay shall be as follows:

	lbs. /ft^3	(kg/m^3)
Ammoniacal Copper Zinc Arsenate (ACZA)	0.40	(6.4)
Chromated Copper Arsenate (CCA)	0.40	(6.4)
Copper Naphthenate	0.060	(0.96)
Pentachlorophenol	0.50	(8.0)

Guardrail post and block spacers shall be pressure treated with Ammoniacal Copper Zinc Arsenate (ACZA), Chromated Copper Arsenate (CCA), Copper Naphthenate or Pentachlorophenol in accordance with the latest version of American Wood Preservers Association Standards (AWPA) P5, P-8, P-9 and C-14, except:

The minimum retention of the preservative in the wood as determined by assay shall be as follows:

	lbs. /ft^3	(kg/m^3)
Ammoniacal Copper Zinc Arsenate (ACZA)	0.50	(8.0)
Chromated Copper Arsenate	0.50	(8.0)
Copper Naphthenate	0.075	(1.2)
Pentachlorophenol	0.60	(9.6)

Treated posts shall be subject to inspection by the Engineer after arrival at the site and no previous inspection at the plant shall bar rejection.

Certified treating reports shall be furnished for all treated timber products to be shipped. Assay reports shall be furnished for a minimum of one out of four charges shipped. One copy of each treating report and assay report shall be shipped with the posts, and a second copy of each report shall be sent to:

ITD Materials Engineer
PO Box 7129
Boise, ID 83707

The treating plant shall imprint legible symbols in the end of all timber products treated indicating the name of the treating company and the type and year of treatment in accordance with AWPA Standard Ml and M6.

ON PAGE 537 & 538, SUBSECTION 711.04- RIPRAP

Delete from the first sentence of the first paragraph: "suitable salvaged concrete, or concrete in sacks".

Delete Part 3 Sack Riprap and Part 4 Concrete Stabilized Riprap.

ON PAGE 538, SUBSECTION 711.05- SEED

Delete from the first paragraph "noxious weed free".

Add the following:

Seed shall be certified by the state of Idaho or authorized (or approved) state agency and be declared "noxious weed free" prior to acceptance.

ON PAGE 538 & 539, SUBSECTION 711.06- PLANTS

Delete the text of this subsection and substitute the following:

Plants shall conform to the applicable requirements of the American Standard for Nursery Stock. Plants shall be true to type and name in accordance with Standard Plant Names prepared by the American Joint Committee on Horticultural Nomenclature. Plants shall be sound, healthy, vigorous, well branched, and densely foliated when leaves are present, and free of disease and/or insects including adult eggs, pupae, or larvae. Plants shall also be free from disfiguring limbs, knots, limb scars, sun scald, abrasions of the bark, wind or freezing damage, or other disfigurements. Plants shall not be cut back from larger sizes to meet specified sizes. The presence of noxious weeds at the source or in the containers may be cause for rejection of plants.

Plants shall be nursery grown unless collected plants are specified. Plants shall be grown or conditioned to those similar to the project site including elevation, site and soil conditions, and climate or the plants may be rejected.

The term "nursery grown" shall include collected woods-grown or natural seedling trees and shrubs, provided such trees and shrubs have been growing continuously in one nursery for the following minimum periods of time:

Plant Material	Time in Nursery
Trees	2 Growing Seasons
Shrubs, Evergreens	2 Growing Seasons
Shrubs, Deciduous	1 Growing Season
Vines	1 Growing Season

Trees shall have straight trunks, well-branched with symmetrical tops. Trees shall have no unhealed scars more than 3/4 in. (20 mm) diameter.

Containerized plants shall be well established in the container with a root system sufficiently developed to retain its shape and hold together when removed from the container. Plants shall not be pot bound, nor have kinked, circling, or bent roots. Plants not properly established or root bound in containers will not be accepted. Plants furnished in pots or containers shall be of a size specified in the plans.

Deciduous plants may be supplied bare-root (B.R.) unless specified otherwise. Plants furnished bare-root shall be one size group larger prior to pruning than the sizes specified in the plans. Deciduous plants furnished bare-root shall be packed in moisture-retaining material.

Broadleaf evergreen plants and conifers shall be furnished balled and burlapped (B&B) or in suitable containers. Balled and burlapped plants, except seedlings, shall be packed with a firm ball of earth surrounded with burlap firmly held in place by a cord or wire wrapping. Balled and burlapped plants shall have firm, natural earth balls of standard size (in accordance with the American Standard for Nursery Stock) and the root collar shall be within the top two inches (2”) of the soil ball. Balled and burlapped plants shall be handled only by the ball and shall be protected against drying and freezing. Broken or loose balls or plants without an adequate root system will not be accepted.

Collected plants shall not be dug until they have been inspected. Collected plants shall be dug with a greater ball or root spread for the applicable plant type as stated in the USA Standard for Nursery Stock.

Packing and shipping of plants shall conform to the applicable requirements set forth in the USA Standard for Nursery Stock.

Required state and federal inspection certificates for plant shipments shall be filed with the Engineer.

Substitutions of plant materials will not be permitted unless authorized in writing and approved by the Engineer. If proof is submitted, substantiated in writing, that a plant specified is not obtainable, consideration will be given to the nearest available size or similar variety, with corresponding adjustment to the contract price.

All plants shall be labeled according to size and scientific plant name and labels shall be durable and legible. Labels shall be attached securely to all plants, bundles, and containers of plant materials when delivered. A certificate of inspection, or a copy thereof, for injurious insects, plant diseases, and other plant pests shall accompany each shipment or delivery of plant materials. The certificate shall indicate the name, address and the source of the stock.

The labels shall be left on at least one plant of a group of the same species and on each plant of individual planting during and after planting operations within the same area.

Allowable anti transpirants are polymer gels; spray on chemicals or natural products.

ON PAGE 539, SUBSECTION 711.08- SOIL CONDITIONER

Delete the text of this subsection and substitute the following:

Soil conditioner shall consist of compost, peat moss, sedge peat, bark or other approved natural material and shall be reasonably free of wood substances and contain 50 percent organic matter by weight. Soil conditioner shall be certified by the state of Idaho or authorized (or approved) state agency and declared "noxious weed free" prior to acceptance. Product shall include inspection certificate from approved commercial or state laboratory or manufacturer's certification prior to acceptance. The source shall be approved prior to shipping to the project.

ON PAGE 539, SUBSECTION 711.09- SELECT TOPSOIL

Add the following to the first paragraph:

Approved sources shall be visually inspected for noxious weeds by the County Weed Authority prior to delivery or placement on the project. Sources shall be tested if noxious weeds are located within or adjacent to the source site and shall be certified as "noxious weed free" by the State of Idaho authorized (or approved) state agency and declared "noxious weed free" prior to acceptance.

ON PAGE 540, SUBSECTION 711.09- SELECT TOPSOIL

Delete the first sentence and substitute the following:

"Select topsoil shall conform to the following:.

ON PAGE 540, SUBSECTION 711.10- MULCH

Add the following before the 1st paragraph:

Mulch shall be certified by the State of Idaho or authorized (or approved) State agency and declared "noxious weed free" prior to acceptance.

ON PAGE 541, SUBSECTION 711.11- EROSION BLANKETS

Add the following after the 1st partial paragraph:

The solid blanket or liquid mixture may consist of either a pre-manufactured roll or a mixture sprayed on the ground. The type of blanket shall be as specified or pre-approved prior to application. Erosion Blanket shall be certified by the State of Idaho or authorized (or approved) state agency and declared "noxious weed free" prior to acceptance.

ON PAGE 541, SUBSECTION 711.13- DUST OIL

Delete this subsection.

ON PAGE 551, SUBSECTION 714.01- GENERAL REQUIREMENTS *

Delete the first paragraph and substitute the following:

Natural pozzlans and fly ash shall conform to the AASHTO M 295, Class F, except that Loss of Ignition (LOI) shall not exceed 1.5 percent for all purposes.
When fly ash is used for mitigation of Alkali Silica Reactivity (ASR) the available alkalies (as Na2O) shall not exceed 1.5 percent, and the calcium oxide (CaO) content shall not exceed 11 percent.

When fly ash is used as a mineral admixture, fly ash meeting Class F requirements shall be used and the limits of the available alkalies and calcium oxide will not apply.

The Contractor shall submit the manufacturer's certification indicating material class and conformance to material specifications.

ON PAGE 557 & 558, SUBSECTION 718.05- DRAINAGE GEOTEXTILE PROPERTY REQUIREMENTS *

Delete the text of this subsection and substitute the following:

Nonwoven or monofilament woven geotextiles are acceptable. Slit film or slit tape geotextiles will not be permitted for drainage applications:

Geotextile Property	*Test Method*	*Minimum Average Roll Values* (in weaker principal direction)	
		Type I (1)	Type II (1)
Grab Tensile Strength – lb. (N)	ASTM D 4632	80 (365)	180 (800)
Grab Elongation (%)	ASTM D 4632	NA	
Puncture Strength – lb. (N)	ASTM D 4833	35 (155)	80 (355)
Apparent Opening Size (AOS) (Std. Sieve)	ASTM D 4751	0.212 mm (#70) Or Finer	
Permittivity (sec^{-1})	ASTM D 4491	0.7	0.7

(1) Type I refers to protected conditions. Type II refers to unprotected conditions. Protected conditions include: trench depth ≤ 10 ft (3 m.), rounded aggregate or crushed aggregate less than 4 in. (100 mm) size, and relatively smooth trench walls. All other conditions are unprotected.

Note: Strength properties of drainage geotextiles placed on level or near level surfaces such as under drain blankets or on subgrade shall meet those specified in Subsection 718.07.

ON PAGE 558, SUBSECTION 718.06- RIPRAP/EROSION CONTROL GEOTEXTILE PROPERTY REQUIREMENTS *

Delete the text of this subsection and substitute the following:

Nonwoven or monofilament woven geotextiles are acceptable. Slit film or slit tape geotextiles will not be permitted for riprap/erosion control applications, including installation behind gabions.

Geotextile Property	Test Method	*Minimum Average Roll Values* (in weaker principal direction)	
		Type I (1)	Type II (1)
Grab Tensile Strength – lb. (N)	ASTM D 4632	130 (580)	200 (890)
Grab Elongation (%)	ASTM D 4632	15	15
Puncture Strength – lb. (N)	ASTM D 4833	60 (270)	80 (355)
Trapezoidal Tear – lb. (N)	ASTM D 4533	40 (180)	50 (225)
Apparent Opening Size (AOS) (Standard Sieve)	ASTM D 4751	#50 (0.3 mm) or Finer	
Permittivity (sec^{-1})	ASTM D 4491	0.5	0.5
Ultraviolet (UV) Radiation Stability	ASTM D 4355	70% Strength Retained @150 hrs.	

(1) Low to moderate survivability geotextiles (Type I) may be used behind gabions less than 10 ft. (3 m) high without an aggregate cushion. In severe conditions, where stones will be larger than 240

lb (110 kg), or drop heights cannot be practically reduced, a higher survivability geotextile (Type II) will be necessary.

ON PAGE 559, SUBSECTION 718.07- SUBGRADE SEPARATION GEOTEXTILE PROPERTY REQUIREMENTS *

Delete the text of this subsection and substitute the following:

Nonwoven or woven geotextiles are acceptable, except that only non woven geotextile can be used for Type III.

Geotextile Property	Test Method	Minimum Average Roll Values (in weaker principal direction)		
		Type I (1)	Type II (1)	Type III (1)
Grab Tensile Strength – lb (N) (2)	ASTM D 4632	180/115 (800/510)	270/180 (1200/800)	270/180 (1200/800)
Grab Elongation (%) (2)	ASTM D 4632	<50%/≥50%	<50%/≥50%	<50%/≥50%
Puncture Strength – lb (N) (2)	ASTM D 4833	70/40 (310/180)	100/75 (445/335)	100/75 (445/335)
Trapezoidal Tear Strength – lb (N)(2)	ASTM D 4533	70/40 (310/180)	100/75 (445/335)	100/75 (445/335)
Apparent Opening Size (AOS) (Standard Sieve)	ASTM D 4751	#30 (0.60 mm) Or Finer		#70 (0.212mm) or finer
Permittivity (sec^{-1})	ASTM D 4491	0.02	0.02	0.7

(1) Type I refers to moderate survivability conditions; Type II and Type III to high survivability conditions. Moderate survivability is low to moderate ground pressure equipment, ≤ 40 psi (275 kPa), with 12 in. to 18 in. (300 mm to 450 mm) initial lift thickness or high ground pressure equipment, > 40 psi (275 kPa), with more than 18 in. (450 mm) initial lift thickness. High survivability is low to moderate ground pressure equipment with 6 in. to 12 in (150 mm to 300 mm) initial lift thickness or high ground pressure equipment with 12 in. to 18 in. (300 mm to 450 mm) initial lift thickness. Subgrade condition is assumed cleared of rocks, stumps & large limbs, and graded reasonably smooth. If subgrade preparation or clearing is not in accordance with the above, or cover material is angular shot rock, even higher survivability geotextiles may be necessary. Type III is used when subgrade separation geotextile will also function in a drainage application.

(2) The dual values for strengths for each geotextile Type are related to the grab elongation. For geotextiles with elongation which is less than 50%, the first strength values are applied. For geotextiles with elongation which is equal or greater than 50%, the second strength values are applied. Higher strength is required for geotextiles with lower elongation.

ON PAGE 559-560, SUBSECTION 718.08- PAVEMENT OVERLAY GEOTEXTILE PROPERTY REQUIREMENTS *

Delete the text of this subsection and substitute the following:

Only non woven geotextiles are acceptable.

Geotextile Property	Test Method	Minimum Average Role Values (in weaker principal direction)
Grab Tensile Strength – lb (N)	ASTM D 4632	80 (355)
Grab Tensile Elongation (%)	ASTM D 4632	50
Trapezoidal Tear Strength – lb (N)	ASTM D 4533	40 (175)
Asphalt Retention – gal/yd2 (L/m2)	ASTM D 6140	0.20 (0.90)

ON PAGE 560, SUBSECTION 718.09- TEMPORARY SILT FENCE GEOTEXTILE PROPERTY REQUIREMENTS *

Delete the text of this subsection and substitute the following:

Geotextiles meeting the following are acceptable:

Geotextile Property	Test Method	Minimum Average Role Values (in weaker principal direction)
Grab Tensile Strength – lb (N)	ASTM D 4632	90 (400)
Grab Elongation (%) [At 50% of minimum Tensile Strength, 45 lb (200 N)]	ASTM D 4632	50 max (1)
Permittivity (sec $^{-1}$)	ASTM D 4491	0.05
Apparent Opening Size (AOS)	ASTM D 4751	#20 (0.85 mm) or finer
Ultraviolet (UV) Radiation Stability Retained	ASTM D 4355	70% Strength Retained @ 150 hrs

(1) For wire fence supported geotextile, elongation requirements are not applicable.

S.S.P. 415 - MICRO SURFACING

Description. This work shall consist of the construction of microsurfacing in accordance with these specifications and in reasonably close conformity with the details shown on the plans, or as established. Micro-surfacing consists of furnishing, mixing, and placing a properly proportioned blend of fine graded aggregate and/or liquid admixture, polymer-modified emulsified asphalt, and water.

The mixture shall be used to fill ruts and to be spread evenly as a surface treatment. The cured slurry shall be homogeneous, fill all cracks, adhere firmly to the surface and have a skid resistant texture.

Materials. Polymer-modified emulsified asphalt shall be quick-set polymer-modified CQS-1HP emulsion conforming to AASHTO M 208 and the following requirements:

Test	Method of Test	Requirement
Viscosity, SF, at 25°C	AASHTO T 59	20 - 100
Residue by distillation	AASHTO T 59	62% minimum
Residue softening point	AASHTO T 53	57°C (135°F) minimum
Residue penetration at 25°C	AASHTO T 49	50 – 80

The polymer material shall be milled or blended into the asphalt or blended into the emulsifier solution prior to the emulsification process. Quick-set emulsion shall be defined as an emulsion used for microsurfacing designed to allow acceptance of rolling traffic on a 1/2 inch (12.7mm) thick surface placed at 75°F (24°C) and 50% humidity within an optimal time of 1 hour.

Water shall be free of harmful soluble salts and shall be of such a quality that the asphalt will not separate from the emulsion before micro-surfacing is in place.

Additives shall be supplied by the emulsion manufacturer. Additives as approved by the manufacturer shall be added to the emulsion mix or any component materials to provide the quick-set properties and increase adhesion. They must be included as part of the mix design and be certified as to their compatibility with the other components of the mix.

Aggregate shall consist of 100 percent (100%) crushed stone, free of organic material, clay, balls, or other deleterious materials.

The aggregate shall conform to the requirements of Subsection 703.01 and the following:

Test	Method of Test	Requirement
L.A. Abrasion	AASHTO T 96	30% maximum
Sand Equivalent	AASHTO T 176	60 minimum

When tested by AASHTO T-27/T-11 the target mix design gradation shall be within the following:

Sieve Size	Percent Passing
3/8 inch (9.5 mm)	100
No. 4 (4.75 mm)	70 - 90
No. 8 (2.36 mm)	45 - 70
No. 18 (1.00 mm)	28 - 50
No. 30 (0.600 mm)	19 - 34
No. 50 (0.300 mm)	12 - 25
No. 100 (0.150 mm)	7 - 18
No. 200 (0.075 mm)	5 – 15

No allowance will be made for screen wear on the maximum size; all aggregate shall pass the 3/ 8 inch (9.5 mm) screen.

Quality control testing during production shall be the responsibility of the contractor. Quality control test reports for gradation and sand equivalent shall be furnished to the Engineer.

Construction Requirements. The contractor shall submit to the Engineer information describing 3 completed micro surface projects consisting of roadway projects a minimum of one mile in length. At a minimum the submittal shall contain the location, project limits, length of time to complete the project and references.

Microsurfacing is to be mixed and spread in a timely manner, to be determined by the Contractor, after the emulsified asphalt arrives on the project.

> "Shotting". While some "shotting" (Small beads of asphalt in suspension in the emulsion) is normal for the emulsion an excessive amount of "shotting", as determined by the Contractor, is an indication that the emulsion is ready to "break" and should not be used.

Mix Design: The mix design is the Contractor's responsibility. The Contractor shall submit a complete mix design that meets the specification, prepared and certified by a qualified laboratory, to the Engineer 1 working day prior to production. The mix design shall be made with the same products, aggregate and gradation the Contractor will provide for the project. The component material shall be within the following limits:

Residual Asphalt -	5.5% to 10.8% by dry weight of aggregate.
Mineral Filler -	0.0% to 3.0% by dry weight of aggregate.
Polymer Based Modifier -	Minimum of 3% solids based on bitumen weight content.

Mixing Equipment: The machine shall be specifically designed and equipped to allow for the application of the micro-surfacing material. The material shall be mixed by an automatic sequenced, self-propelled micro-surfacing mixing machine. The machine shall be a continuous flow mixing unit, able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, control setting additive, and water in a revolving multi-blade double shafted mixer. The machine shall discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity to maintain an adequate supply to the proportioning controls. Use of truck mounted units will not be allowed.

Proportioning Device: Individual volume or weight controls for proportioning each material to be added to the mix (i.e., aggregate, mineral filler, emulsified asphalt, additive, and water) shall be provided and properly marked. These proportioning devices are usually revolution counters or similar devices and are used in material calibration and in determining the material output at any time and will require prior approval by the Engineer for use.

Spreading Equipment: The mixture shall be spread uniformly by means of a conventional augured surfacing spreader box attached to the mixer and equipped with paddles to agitate and spread the material throughout the box. A front seal shall be provided to insure no loss of mixture at the road contact point. The rear seal shall act as final strike-off and shall be adjustable. The spreader box shall have suitable means provided to side shift the box to compensate for variations in the pavement geometry.

Auxiliary Equipment: Suitable surface preparation, equipment, traffic control equipment, hand tools, and other support equipment shall be provided as necessary to perform the work.

Calibration: Each mixing unit used in performance of the work shall be calibrated in the presence of the Engineer prior to construction. Notify the Engineer one working day in advance when calibration is to be performed. Previous calibration documentation covering the exact materials to be used may be acceptable, provided they were performed the current calendar year. The documentation shall include an individual calibration of each material at various settings, which can be related to the machine's metering devices. No machine will be allowed to work on the project until the calibration has been completed or documentation accepted.

Weather Limitations: Due to the rapid breaking nature of the asphalt, micro-surfacing shall not be applied if the air temperature is greater than 100°F (38°C) and can only be applied when both pavement and air temperature are above 70°F (21°C) and rising. No micro-surfacing shall be applied when there is danger that the finished product will freeze or be rained on within 24 hours. The mixture shall not be applied when weather conditions prolong opening to traffic beyond a reasonable time.

Surface Preparation: Immediately prior to applying the micro-surfacing, the surface shall be cleared of all vegetation, loose material, dirt, mud, and all other extraneous materials. If water is used, cracks shall be allowed to dry thoroughly before micro-surfacing application. The Contractor shall obtain approval of the surface preparation prior to micro-surfacing.

Mix Stability: The micro-surfacing shall possess sufficient stability so that premature breaking of the emulsion in the spreader box does not occur. The mixture shall be homogeneous during and following mixing and spreading. It shall be free of excess water or emulsion and free of segregation of the emulsion and aggregate fines from the coarser aggregate.

Water Application: At dry, oxidized surface locations, the surface shall be pre-wetted by fogging ahead of the spreader box. The rate of application of the fog spray shall be adjusted during the day to suit temperatures, surface texture, humidity, and dryness of the pavement. Water used for this pre-wetting is incidental to the placement of the micro-surfacing.

Appearance of the Mix. The micro-surfacing shall be of the desired consistency upon leaving the mixer. A sufficient amount of material shall be carried in all parts of the spreader box at all times so that a complete coverage is obtained. Minimum coverage thickness shall be 3/8 inch (9.5 mm). Maximum coverage thickness shall be 5/8 inches (16 mm), except in ruts. Overloading of the spreader shall be avoided. No lumps, balls, or unmixed aggregate shall be permitted.

No streaks, such as those caused by oversized aggregate, shall be left in the finished surface. If streaking develops, then the work will be stopped until the Contractor proves to the Engineer that the situation has been corrected. Screening of the material may be required just prior to loading it into the units going from the stockpile area to the lay down operation.

Joints: No excess buildup, uncovered areas, or unsightly appearance shall be permitted on joints. The surface will be straight edged by the Contractor, at locations to be, with a 10 foot (3 m) straightedge. When the straightedge is laid flat on the pavement in a direction parallel to centerline or normal to

centerline, the surface shall not vary more than 1/4 inch (6.5 mm) from the lower edge. The straightedge shall be provided by the Contractor.

Hand Work: Areas which cannot be reached with the mixing machine shall be surfaced using squeegees to provide complete and uniform coverage. If necessary, the area to be hand worked shall be lightly dampened prior to mix placement. Care shall be exercised to leave no unsightly appearance from handwork. The same type of finish applied by the spreader box shall be required. Irregularities in placement of microsurfacing at the locations of temporary traffic control markers shall be repaired by handwork.

Handwork shall be completed during the machine application process.

Traffic Control and Curing: Adequate means shall be provided to protect the micro-surfacing from damage by traffic until the mixture has cured sufficiently so it will not be damaged by the tires of vehicles. Any damage done by traffic to the micro-surfacing shall be repaired by the Contractor without separate payment. The Engineer shall be notified in writing of the traffic control methods and at least 2 days plans prior to use.

Temporary Flexible Raised Pavement Markers (tabs) shall NOT be used during microsurfacing.

Micro-surfacing applied for rut filling shall be allowed to cure at least 24 hours before being covered by the full lane width placement. Traffic may be permitted on the rut filling material during this period under the same requirements for protection, surface preparation, and repair as for other placements.

Clean-up: The Contractor shall remove daily any debris associated with the performance of the work.

Acceptance: Acceptance of the asphalt emulsion and aggregate will be based on the following:

Polymer-modified Emulsified Asphalt: The polymer-modified emulsified asphalt shall be accepted by manufacturer's certification which shall include the viscosity and residue percent obtained at the plant.

The asphalt will be sampled twice a day from a random truck or trailer at the jobsite by the State according to AASHTO T40 and the samples will be immediately shipped to ITD Central Laboratory for viscosity and distillation residue laboratory verification testing. A price adjustment in accordance with Section 350.02.03 of the ITD Laboratory Operations Manual will be applied when test results indicate the asphalt does not meet the specifications.

Field testing shall be performed by the Contractor for the purpose of ensuring that the asphalt emulsion has not broken excessively during transportation to the project. Prior to introduction to the micro-surfacing machine, each load of emulsion shall be checked for "shotting" by sieving as described in AASHTO T-59 Sieve Test (Sodium Oleate Solution not required). Documentation of the results shall be provided to the Engineer.

Aggregate: The Contractor shall have all aggregate stockpiled before placement operations begin at any one location. Stockpile locations within the State right-of-way must be approved prior to use.

The aggregate stockpile will be sampled and tested by the State for acceptance in accordance with the ITD Quality Assurance Manual Section 270.00 Minimum Testing Requirements, page 412-1, Plant Mix Seal Aggregate for gradation and sand equivalent only. Aggregate material not meeting the specifications will be rejected.

Method of Measurement. Micro-surfacing Aggregate will be measured by the ton (metric ton). Polymer-modified emulsified asphalt will be measured by the ton (metric ton), including mineral filler, water, polymer-modified emulsified asphalt and additives.

Basis of Payment. Payment for accepted work will be made as follows:

Pay Item	Pay Unit
Micro-surfacing Aggregate	Ton (t)
Polymer-Modified Emulsified Asphalt	Ton (t)

Payment also includes water, cleaning the surface, and protecting the micro-surfacing until it has set sufficiently to allow traffic to run on the new surface without displacing the new material.