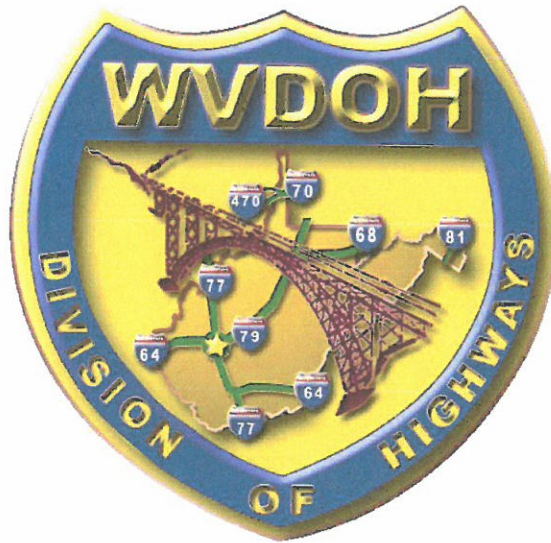


**WEST VIRGINIA
DIVISION OF HIGHWAYS**



**STANDARD SPECIFICATIONS
ROADS AND BRIDGES
Adopted 2010**

SECTION 101 DEFINITION OF TERMS

101.1-ABBREVIATIONS:

Whenever the following abbreviations are used in these Specifications, Plans or Contract Documents, they are to be construed the same as the respective expressions represented:

AAN	American Association of Nurserymen
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
AIA	American Institute of Architects
AISC	American Institute of Steel Construction, Incorporated
AISI	American Iron and Steel Institute
AMA	Automotive Manufacturer's Association
AMS	Aerospace Material Specification
ANSI	American National Standards Institute
ARA	American Railway Association
AREA	American Railway Engineering Association
AREMA	American Railway Engineering and Maintenance of Way Association
ASCE	American Society of Civil Engineers
ASD	Aluminum Standards & Data-Aluminum Association
ASLA	American Society of Landscape Architects
ASTM	American Society for Testing and Materials
ATSSA	American Traffic Safety Services Association
AWWA	American Water Works Association
AWS	American Welding Society
FHWA	Federal Highway Administration
FSS	Federal Specifications and Standards, General Services Administration
IEEE	Institute of Electronic and Electrical Engineers
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
MIL	Military Specification
MP	Materials Procedure (see 101.2 in definition)
NBFU	National Board of Fire Underwriters
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
PEI-ALS	Porcelain Enamel Institute: Aluminum Standards
UL	Underwriters Laboratories
SAE	Society of Automotive Engineers
SSPC	Society for Protective Coatings
TTE-TTP	Federal Specifications and Standards

The Division may at its discretion issue to a Contractor a Proposal requiring prequalification in excess of the amount allotted the Contractor provided it considers that this Contractor is particularly fitted by reason of their experience or equipment, or both, to perform work of this type involved in an amount exceeding their prequalification limits and further provided that the prospective bidder furnish the Division with a letter from a reputable Surety advising of their willingness to furnish bond to the Contractor for the project.

When more than one project is advertised, Proposals will be issued on as many projects as the Contractor requests, providing the Contractor is qualified as above for each individual project, but no contracts will be awarded exceeding the permissible limit of the Contractor's prequalification rating except as otherwise provided in 103.1.

102.4-INTERPRETATION OF APPROXIMATE ESTIMATES:

The quantities appearing in the proposal form are approximate only and are prepared for the comparison of bids. Payment to the Contractor will be made only for the work accepted, or for materials furnished in accordance with the Contract. If upon completion of the construction the actual quantities show either increase or decrease, the unit bid prices offered in the Proposal will prevail except as further provided.

102.5-EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE OF WORK:

The bidder is required to examine carefully the Plans, Specifications, Supplemental Specifications, contract forms, and the site of the work contemplated. The submission of a bid shall be considered prima facie evidence that the bidder has made such examination and has judged for and satisfied themselves as to the character, quality, and quantity of work to be performed and material required to be furnished under the Contract.

102.6-PREPARATION OF PROPOSAL:

The bidders Proposal must be submitted through the Division's Bid Express Website. The bidder must furnish a unit price or a lump sum price as called for in the Proposal, in numerical figures, for each pay item listed, except that in the case of alternates, the bid may be made on only one alternate if so desired.

The Contractor or qualified and authorized agent shall use a digital signature as provided at law for the Proposal submission.

The proposal shall comply with West Virginia Contractor Licensing Act, Chapter 21, Article 11 Code of West Virginia, except that on Federal-Aid Projects a Contractor's license is not required at time of bid, but will be required before work can begin.

102.7-IRREGULAR PROPOSALS:

Proposals will be considered irregular and will be rejected for any of the following reasons:

SECTION 105 CONTROL OF WORK

105.1-AUTHORITY OF THE ENGINEER:

The Engineer will decide all questions which may arise as to the quantity, 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. The decision of the Engineer will be final.

The Engineer will have the authority to suspend the work wholly or in part due to the failure of the Contractor to correct conditions unsafe for the employees or the general public, for failure to carry out orders, for such periods as the Engineer may deem necessary due to unsuitable weather, for conditions considered unsuitable for the prosecution of the work, or for any other condition or reason deemed to be in the public interest. All such suspension orders will be directed to the Contractor in writing.

The Engineer is not authorized to increase the obligation of the Division to any Contract except as provided.

105.2-PLANS AND WORKING DRAWINGS:

Approved Plans will show the location, profile, typical cross section, structures, except as specified, incidental items, and a summary of all items appearing in the Proposal. Any deviations which may be required by the exigencies of the construction will be determined by the Engineer and authorized by the Engineer in writing. The Contractor shall keep one set of approved Plans available on the work at all times.

Plans will show such details as are necessary to give a comprehensive idea of the construction contemplated. Any information which may be shown on drawings regarding results obtained from test piles or borings will be a record of conditions encountered at the place where such test piles were driven or borings were made, as nearly as these conditions could be interpreted by the Engineer observing the operations. The Contractor shall interpret the data in the light of their own experience. The Contractor is not bound to accept or rely on the data shown on the drawings, but may make such additional borings and investigations, including test piles, as the Contractor may desire in order to satisfy themselves concerning the lengths of piles and the conditions governing or entering into the construction of foundations.

The Plans will show the foundation depths and dimensions on which the estimate of quantities is based. These depths and foundation dimensions, however, are subject to such variations as may be necessary to secure a foundation satisfactory to the Engineer, and the right is expressly reserved to increase or diminish the dimensions and depths of the foundations as the Engineer may determine.

The Contractor shall submit to the Engineer all stress sheets, shop drawings, erection plans, falsework plans, framework plans, cofferdam plans, bending diagrams for reinforcing steel, or any other supplemental plans or similar data for the Engineers use.

any submittal which does not comply with the requirements of this Special Provision. The verification and distribution or rejection of Contractor approved shop drawings will normally require seven (7) calendar days after receipt of the drawings.

Additional certifications and/or slightly different wording of the above tow certification may be used if approval is given by the Legal Division. This approval must be obtained prior to any submission of contractor approved shop drawings. This approval may take up to thirty (30) days to be obtained. If this approval is obtained, a copy of the approval letter must be submitted with the first submission of shop drawings for distribution.

The Division shall reserve the right to review any submission of shop drawings or catalog sheets. This review shall not delay the contractor in the construction project or delay the distribution of the approved shop drawings or catalog sheets.

105.3-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.

Should the Engineer determine the materials, or the finished product do not conform to the Specifications or the Plans, the Engineer will then make a determination if the work will be accepted and remain in place in accordance with 106.3.1 and 106.7. In this event, the Engineer will document the basis of acceptance by contract modification which will provide for an adjusted payment. All nonconforming material or construction judged to be inadequate for the use intended shall be either reworked or removed and replaced at no expense to the Division.

Each supplemental agreement containing an adjusted price will also have added the sum of Two Hundred Dollars to each adjusted price, for the Divisions administration costs, to be deducted from monies due the Contractor.

105.4-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 case of discrepancy, calculated dimensions will govern over scaled dimensions; Supplemental Specifications will govern over Specifications; Plans will govern over Specifications and Supplemental Specifications; Special Provisions will govern over Specifications, Supplemental Specifications and Plans. When the plans provide that new work is to connect with existing structures, the Contractor must verify all dimensions with the Engineer before proceeding with the work.

The Specifications, Supplemental Specifications, and Special Provisions are in dual units. The first Primary unit is in English with the Metric unit

following in parentheses “()”. The Metric values are considered replacements for the English units and they are not conversions.

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 Contractor shall immediately notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the Plans and Specifications.

105.5-COOPERATION BY CONTRACTOR:

The Contractor will be furnished One (1) complete set of plans and profile sheets, and one (1) set of Cross Sections upon request, without charge. The Contractor shall maintain on the Project at all times one complete set of Plans, Specifications, and Special Provisions.

The Contractor shall give the work the constant attention necessary to facilitate the progress thereof, and shall cooperate with the Engineer, their inspectors, other Contractors, and utilities 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 an 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 irrespective of the amount of work sublet.

The Contractor shall furnish to the Engineer a list of addresses and telephone numbers of their personnel who may be reached in case of emergency during hours when no work is to be performed. On weekends, holidays, during suspensions of work, and during storms the Contractor shall alert certain of their personnel to stand by and shall inform the Engineer of arrangements so made.

The Contractor shall provide all reasonable facilities and furnish the Division the information, assistance and samples required by the Engineer and Inspector for proper inspecting or testing of materials and workmanship.

On some contracts it may be necessary, to insure proper coordination between the work of the Contractor and the work of various utilities, to hold a pre-construction utility meeting. The Division will arrange for the affected utilities to be present. The Contractor or their representative, authorized to make decisions for them in regard to the scheduling of the proposed work, is required to attend the meeting. A report of the pre-construction utility meeting will be prepared and distributed by the Engineer to all represented at the meeting.

105.6-COOPERATION WITH UTILITIES:

The Division will notify all utility companies, all pipe line owners, or other parties affected, and endeavor to have all necessary adjustments of the public or private utility fixtures, sewers, pipe lines, and other appurtenances within or adjacent to the limits of construction, made as soon as practicable.

Water lines, gas lines, wire lines, sewer lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals, and all other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted are to be moved by the owners

with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

In the event the Engineer finds further coordination effort is necessary, the Engineer shall call a meeting of the Contractors involved. After the meeting has been held, the Engineer may notify the Contractors of the action required of each and the Engineer's decision shall be final.

105.8-CONSTRUCTION STAKES, LINES AND GRADES:

Except when "Construction Layout Stakes", is included in the Contract, the Engineer will set construction stakes establishing lines, slopes and continuous profile-grade, together with necessary reference stakes and bench marks. The Engineer will set sufficient right-of-way stakes to define the right-of-way limits. The Engineer will set stakes to mark centerline and establish bench marks for bridges and special structures as may be considered necessary.

The stakes and marks in the paragraph above shall constitute field control by and in accordance with which the Contractor shall establish all additional stakes and marks necessary to secure a correct layout of all the work. All stakes, except those set by the Engineer, shall be furnished by the Contractor. The Contractor shall not engage the services of any person or person in the employ of the Division for the performance of any of the Contractor's layout work.

The Contractor shall be responsible for having the finished work in reasonably close conformity with the lines, grades, elevations, and dimensions called for on the Plans or established by the Engineer. The Contractor shall be held responsible for the preservation of stakes, marks, and references, and shall have them reset at the Contractor's expense when they are damaged, lost, displaced, or removed.

105.9-AUTHORITY AND DUTIES OF THE PROJECT ENGINEER OR PROJECT SUPERVISOR:

The project Engineer or Supervisor has immediate charge of the engineering details of each construction project. The Engineer or Supervisor are responsible for the administration and satisfactory completion of the project.

The Project Engineer or Supervisor has the authority to reject defective material and to suspend any work that is being improperly performed.

The Project Engineer or Supervisor will have the authority to suspend the work wholly or in part due to the failure of the Contractor to correct conditions unsafe for the employees or the general public; for failure to carry out provisions of the Contract; for failure to carry out orders; for such periods as they may deem necessary due to unsuitable weather. All such suspension orders will be directed to the Contractor in writing. The suspension of the work for the above reasons does no relieve the Contractor of their responsibility according to 107.16.

105.10-AUTHORITY AND DUTIES OF THE INSPECTOR:

Inspectors employed by the Division 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 the Contract. The Inspector is authorized to call the attention of the Contractor to any failure of the work or materials to conform to the Specifications and Contract.

The Inspector is authorized to reject materials which do not meet specification requirements or suspend the portion of the work involved until any question at issue can be referred to the Project Engineer or Project Supervisor. The Inspector is not authorized to issue instructions contrary to the Plans and Specifications. The Inspector shall not act as foreman or perform other duties for the Contractor, nor interfere with the management of the work by the latter.

105.11-INSPECTION OF WORK AND MATERIALS:

All materials and each part or detail of the work shall be subject to inspection by the Engineer. The Engineer or a representative shall be allowed 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. To facilitate the inspection of materials, all delivery tickets shall contain as a minimum the information required in MP 700.00.01.

At the Engineer's request, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. 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 shall be at the Contractor's expense.

Any work done or materials used without supervision or inspection by an authorized Division representative may be ordered removed and replaced at the Contractor's expense. Failure to reject any defective material or work shall not in any way prevent later rejection when such defects are discovered, nor obligate the Division to final acceptance.

When any unit of government or political subdivision or any railroad corporation 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 any railroad corporation a party to this Contract, and shall in no way interfere with the rights of either party hereunder.

No work shall be done at night, Saturdays, Sundays, or Holidays without documented prior approval of the Engineer.

105.12-REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK:

Except as provided in 105.3, all work which does not conform to the requirements of the Contract will be considered as unacceptable work.

Unaccepted 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.

Unacceptable material shall be removed from the job site.

No work shall be done without lines and grades having been given or approved by the Engineer. Work done contrary to the instructions of the Engineer, work done beyond the lines shown on the Plans, or as given, except as 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 promptly with any order of the Engineer, made under the provisions of this Subsection, the Engineer will have 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 RESTRICTIONS:

The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads. A special permit will not relieve the Contractor of liability for damage which may result from the moving of equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or the roadway or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base or structure before the expiration of the curing period. In no case shall legal load limits be exceeded unless permitted in writing. The Contractor shall be responsible for all damage done by their own equipment.

105.14-MAINTENANCE DURING CONSTRUCTION:

The Contractor shall maintain the work during construction and until the project is accepted except as otherwise provided in 105.16.1. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces to the end that the roadway and 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.

All cost of maintenance work during construction and before the project is accepted 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 except as otherwise provided in 104.5.

105.15-FAILURE TO MAINTAIN ROADWAY OR STRUCTURE:

If the Contractor, at any time, fails to comply with the provisions of 105.14, the Engineer will immediately notify the Contractor of such non-compliance. If the Contractor fails to remedy unsatisfactory maintenance within 24 hours after receipt of such notice, the Engineer may immediately proceed to maintain the project, and the entire cost of maintenance will be deducted from monies due or to become due the Contractor on their Contract.

105.16-ACCEPTANCE:

105.16.1-Partial Acceptance: If at any time during the prosecution of the project, the Contractor completes a unit or portion of the project, such as a structure, an interchange, or a section of road or pavement, the Contractor may request the Engineer to make final inspection of that unit. If the Engineer finds upon inspection that the unit has been completed in compliance with the

as provided in 652 without additional compensation. Where practicable, borrow pits, gravel pits, and quarry sites shall be located so they will not be visible from the highway.

In accordance with the agreement between the Division of Highways and the Division of Environmental Protection, the Contractor cannot furnish material from borrow areas outside the right of way for any other public or private use.

106.3-SAMPLES, TESTS, CITED SPECIFICATIONS:

All materials will be inspected, tested and approved prior to incorporation into the work. Any work which incorporates materials prior to the above evaluation shall be performed at the Contractor's risk, and may subsequently be considered as unacceptable. Unless otherwise specified, the materials shall meet the applicable Standard or Interim Specifications of the American Association of State Highway and Transportation Officials, the Standard or Tentative Specifications of the American Society for Testing and Materials, or Standards adopted by other specifying agencies, with preference given in the same order in which the above agencies are listed. The specification which is current at the time of advertisement for bids shall govern, except that, with the approval of the Engineer, subsequent revisions or adoptions may govern. All materials being used are subject to inspection, testing or rejection at any time prior to final acceptance of the completed work.

The Contractor shall be responsible for the quality of construction and materials incorporated. When called for in the Specifications, the Contractor shall perform all necessary process control inspection, sampling and testing. All materials will be approved for acceptance through the Division's acceptance procedures. The Division has the exclusive right and responsibility for determining the acceptability of the construction and materials incorporated. The Division may use the results of the Contractor's inspection, sampling and testing for acceptance purposes.

Lot or subplot sizes will normally be designated. In the event that operational conditions cause work to be interrupted, or only partially completed before the lot size designated has been achieved, the lot or subplot may be redefined by the Engineer as being either the amount of work accomplished within the day or that work partially completed combined with the next lot or subplot of work. It is the intent of these Specifications that the number of samples required to evaluate each lot or subplot will be unchanged even when the lot or subplot is redefined.

When an acceptance plan is cited, it shall be in accordance with 106.3.1.

106.3.1-Acceptance Plans:

106.3.1.1-Percent Within Tolerance: The percentage of each lot or subplot of material, product, item of construction, or completed construction within the specified tolerances will be determined by the procedures as referenced by the specification requirements. When West Virginia AP-A is referenced, it will consist of Tables 106-1 to 106-5 inclusive, published in MP 106.00.20.

106.3.1.2-Sampling of Reworked Lots or Sublots: It is the intent of these Specifications that lots or sublots of materials, products, items of construction or completed construction meet specification requirements at the time of submission. Lots or sublots generally will not be resampled unless reworked before submission. Sampling after reworking will be at the expense of the Contractor.

106.4-PLANT INSPECTION:

The Engineer may undertake the inspection of materials at the source.

In the event plant inspection is undertaken, the following conditions shall be met:

- i. The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.
- ii. 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.
- iii. Adequate safety measures are to be provided and maintained.

The Division reserves the right to retest all materials, which have been tested and accepted at the source of supply, after the materials have been delivered to the project and prior to incorporation into the work and to reject all materials which, when retested, do not meet the requirements of these Specifications or those established for the specific project.

106.5-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 their prompt inspection. Approved portions of the right-of-way may be used for storage purposes and for the placing of the Contractor's plant and equipment, but any additional space required therefore must be provided by them at their expense. 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. All storage sites shall be restored to their original condition by the Contractor at their expense. This shall not apply to the stripping and storing of topsoil, or to other materials salvaged from the work.

Care shall be exercised to protect finished concrete surfaces from being stained from storing or placing materials, including but not limited to reinforcing bars or mesh or unpainted structural steel, on same. Any such material so stored shall be adequately protected from weather. Any stains resulting from storage of materials on finished concrete surfaces shall be removed by the Contractor at their expense.

Aggregate stockpiles may be made on ground that is denuded of vegetation, hard, and well drained. If necessary, the ground shall be covered with two inch (50 mm) plank. Different kinds and sizes of aggregates shall be kept separate during transportation, handling, and storage until batched. If necessary,

partitions of suitable height and strength shall be constructed between stockpiles to prevent different materials from becoming mixed. Care must be taken to prevent segregation of the coarse and fine particles of aggregates from taking place during handling or hauling. The inclusion of foreign materials will not be permitted. Aggregates placed directly on the ground shall not be removed from the stockpiles within one foot (300 mm) of the ground until the final cleaning up of the work, and then only the clean aggregate will be permitted to be used.

106.6-HANDLING MATERIALS:

All materials shall be handled in such manner as to preserve their quality and fitness for the work. Aggregates shall be transported from the storage site to the work in tight vehicles, so constructed as to prevent loss or segregation of materials after loading and measuring, in order that there may be no inconsistencies in the quantities of materials intended for incorporation in the work as loaded and the quantities as actually received at the place of operations.

106.7-UNACCEPTABLE MATERIALS:

106.7.1-Acceptance or Rejection: Following the application of the appropriate acceptance plan, the decision of the Engineer will be final as to the acceptance, rejection, or acceptance at an adjusted price of sampled lots or sublots.

106.7.2-Disposition of Lots or Sublots: Lots or sublots not conforming to specification requirements may be reworked or removed and replaced and resubmitted for acceptance. All nonconforming lots or sublots evaluated as unsatisfactory for the use intended shall be reworked or removed and replaced and resubmitted for acceptance. When the evaluation indicates the lots or sublots may satisfactorily remain in place, acceptance will be an adjusted price as stated in the Specifications or as directed by the Engineer.

106.8-DIVISION-FURNISHED MATERIAL:

The Contractor shall furnish all materials required to complete the work, except those specified to be furnished by the Division.

Materials furnished by the Division will be delivered or made available to the Contractor at the points specified in the Contract.

The cost of handling and placing all materials after they are furnished 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 to them, and deductions will be made from any monies due the Contractor 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.

106.9-SILENCE OF SPECIFICATIONS:

The apparent silence of these Specifications, Supplemental Specifications, plans and Special Provisions as to any detail, or the apparent omission from them of a detailed description concerning any point shall be regarded as meaning that only material and workmanship of acceptable quality are to be used.

SECTION 107

LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

107.1-LAWS TO BE OBSERVED:

The Contractor shall keep fully informed of all Federal and State laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such 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 laws, ordinances, regulations, orders, or decrees, whether by themselves, their subcontractors or their employees.

107.2-PERMITS, LICENSES AND TAXES:

The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the work.

107.3-PATENTED DEVICES, MATERIALS, AND PROCESSES:

If the Contractor employs any design, devise, 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 Division, and affected third party, or political subdivision from and claims for infringement by reasons of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Division for any costs, expenses, and damages which it may be obligated to pay by reason of any infringement, at any time during the prosecution or after the completion of the work.

107.4-RESTORATION OF SURFACES OPENED BY PERMIT:

The right to construct or reconstruct any utility service in the highway or street or to grant permits for same, at any time, is expressly reserved by the Division for the proper authorities of the municipality in which the work is done, and the Contractor shall not be entitled to any damages either for the digging up of the street or for any delay occasioned.

Any individual, firm, or corporation wishing to make an opening in the highway must secure a permit from the Division. The Contractor shall allow parties bearing such permits, and only those parties, to make openings in the highway. The Contractor shall, when ordered by the Engineer, make in an acceptable manner all necessary repairs due to such openings and such necessary work will be paid for as "Extra Work", or as provided in these Specifications, and will be subject to the same conditions as original work performed.

107.5-FEDERAL-AID PROVISIONS:

When the United States Government pays any portion of the cost of a project, the Federal Laws and the Rules and Regulations made pursuant to such laws must be observed by the Contractor, and the work shall be subject to the inspection of the appropriate Federal Agency.

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

When or where and 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 nonexecution thereof by the Contractor, the Contractor shall restore, at their own expense, 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 the Contractor shall make good such damage or injury in as acceptable manner.

107.13-FOREST PROTECTION:

In carrying out work within or adjacent to State or National Forests, the Contractor shall comply with all regulations of the State Fire Marshall, Division of Natural Resources, or any other authority having jurisdiction, governing the protection of forests and the carrying out of work within forests, and shall observe all sanitary laws and regulations with respect to the performance of work in forest areas. The Contractor shall keep the areas in an orderly condition, dispose of all refuse, obtain permits for the construction and maintenance of all construction camps, stores, warehouses, residences, latrines, cesspools, septic tank, and other structures in accordance with the requirements of the Forest Supervisor.

The Contractor shall take all reasonable precaution to prevent and suppress forest fires and shall require their 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 possible effort to notify a forest official at the earliest possible moment of the location and extent of any fire seen by them.

107.14-RESPONSIBILITY FOR DAMAGE CLAIMS:

The Contractor shall indemnify and save harmless the Division, its officers and employees, from all suits, actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; 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 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 "Worker's Compensation Act," or any other law, ordinance, order, or decree; and so much of the money due the Contractor under and by virtue of their Contract as may be

considered necessary by the Division for such purpose may be retained for the use of the Division or, in case no money is due, their surety may be held until such suit or suits, action or actions, claim or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the Division; except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that the Contractor is adequately protected by public liability and property damage insurance.

107.15-OPENING SECTIONS OF PROJECT TO TRAFFIC:

At the option of the Engineer, certain sections of the work may be opened for traffic. Such opening will not constitute acceptance of the work, or any part thereof, or a waiver of any provisions of the Contract; provided however, that on such portions of the project as are accepted for use of traffic, the Contractor shall not be required to assume any expense entailed in maintaining the roadway for traffic. Such expense will be borne by the Division or will be compensated for in the manner provided in 109.4. Any damage to the highway not attributable to traffic which might occur on such section, except slides, shall be repaired by the Contractor at their expense. The removal of slides shall be performed by the Contractor and payment will be in accordance with 104.3.

If the Contractor is dilatory in completing shoulders, drainage structures, or other features of the work, the Engineer may order all or a portion of the project open to traffic, but in such event the Contractor shall not be relieved of their liability and responsibility during the period the work is so opened prior to final acceptance. The Contractor shall conduct the remainder of their construction operations so as to cause the least obstruction to traffic.

107.16-CONTRACTOR'S RESPONSIBILITY FOR WORK:

Until final written acceptance of the project by the Engineer, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part thereof by the action of the elements, or from the nonexecution of the work. 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 of or negligence of the Contractor, including but not restricted to acts of God, of the public enemy or governmental authorities.

In case of suspension of work from any cause whatever, 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 and to erect any necessary temporary structures, signs, or other facilities at their expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established plantings, seedings, and soddings furnished under their Contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

107.17-CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTY AND SERVICES:

At points where the Contractor's operations are adjacent to properties of railway, telegraph, telephone, and power companies, or are adjacent to other property, damage to which might result in considerable expense, loss, or inconvenience, work shall not be commenced until all arrangements necessary for the protection thereof have been made.

The Contractor shall cooperate with the owners of any underground or overhead utility lines in their removal and rearrangement operations in order that these operations may progress in a reasonable manner, that duplication of rearrangement work may be reduced to a minimum, and that services rendered by those parties will not be unnecessarily interrupted.

In the event of interruption to water or utility services as a result of accidental breakage, or as a result of being exposed or unsupported, the Contractor shall promptly notify the proper authority and shall cooperate with such authority in the restoration of service. If water 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.

107.18-FURNISHING RIGHT-OF-WAY:

The Division will be responsible for securing all necessary right-of-way in advance of construction. Any exceptions will be indicated in the Contract.

107.19-PERSONAL LIABILITY OF PUBLIC OFFICIALS:

In carrying out any of the provisions of these Specifications, or in exercising and power or authority granted to them by or within the scope of the Contract, there shall be no liability upon the Commissioner, Engineer, or their authorized representatives, either personally or as officials of the State, it being understood that in all such matters they act solely as agents and representatives of the Division.

107.20-NO WAIVER OF LEGAL RIGHTS:

The Division 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 therefor, 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 Division shall not be precluded or estopped, notwithstanding and 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 their failure to comply with the terms of the Contract. Neither the acceptance by the Division or any representative of the Division, 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 Division, shall operate as a waiver of any portion of the Contract or of any power 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.

108.8-DEFAULT AND TERMINATION OF CONTRACT:

If the Contractor:

1. fails to begin work under the Contract within the time specified in the "Notice to Proceed"; or
2. fails to perform the work with sufficient employees and equipment or 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;
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. allows any final judgment to stand against the Contractor unsatisfied for a period of ten (10) days; or
8. makes an assignment for the benefit of creditors; or
9. for any other cause whatsoever, fails to carry out the Contract terms in an acceptable manner;

the Engineer will give notice in writing to the Contractor and his/her Surety of such delay, neglect or default. If the Contractor or Surety, within a period of ten (10) days after such notice, shall not proceed in accordance therewith, the Division 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 terminate the Contract. The Division 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 with another contractor for the completion of the 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.

All cost charges incurred by the Division, together with the cost of completing the work under Contract, will be deducted from any money 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 Division the amount of such excess.

108.9-TERMINATION OF CONTRACT FOR CONVENIENCE OF THE STATE:

The Division may terminate the entire Contract or any portion thereof, if the Engineer determines that a termination is in the Division's interest. The Engineer will deliver to the Contractor a Notice of Termination specifying the extent of termination and the effective date.

SECTION 109 MEASUREMENT AND PAYMENT

109.1-MEASUREMENT OF QUANTITIES:

All work completed under the Contract will be measured by the Engineer according to United States standard measure.

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

Unless otherwise indicated, the requirements prescribed shall govern.

Earthwork will be computed by the average end area method, using the horizontal length measured along the centerline as the distance between sections, applying corrections for curvature where the apparent error exceeds 25 percent of the volume in any one cut. Other acceptable methods may be used.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally and no deductions will be made for individual fixtures having an area of nine square feet (one square meter) or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the Plans or ordered in writing by the Engineer.

Structures will be measured according to neat lines shown on the Plans or as altered to fit field conditions.

All items which are measured by the linear foot (meter), such as pipe culverts, guardrail, underdrains, etc., will be measured parallel to the base or foundations upon which such structures are placed.

The term "gage" when used in connection with the measurements of plates, will mean the U.S. Standard Gage.

The galvanized sheet thicknesses to be used in the manufacture of metal cribbing, corrugated steel culvert pipe, underdrain pipe, plate pipe, pipe arches, plate pipe arches and plate arches shall be as specified in AASHTO M 36 or AASHTO M 167. The sheet thicknesses to be used in the manufacture of corrugated aluminum alloy culvert pipe, underdrain pipe, plate pipe, pipe arches, plate pipe arches and plate arches shall be as specified in AASHTO M 196 or AASHTO M 219.

The "size number" used in the measurement of wire will be as specified in AASHTO M 32 or AASHTO M 225.

The term ton will mean the short ton consisting of 2,000 lb (The term megagram is defined as a mass of 1,000 kg). All materials which are measured or proportioned by weight shall be weighed on approved scales by competent, qualified personnel. Scales for weighing shall be of either the beam type, springless-dial type or digital recorder type. All plant and truck scales and metering devices shall be inspected, approved and sealed in accordance with the requirements of the West Virginia Division of Labor, Bureau of Weights and Measures, or other appropriate agencies of the State or its political subdivisions. Poles shall be designed to be locked in any position to prevent unauthorized changes. When the beam type scales are used, provisions for a "telltale" dial shall be made for indicating to the operator that the required load in the weighing hopper is being approached. A device on the weighing beams shall clearly indicate the critical position.

Truck scales shall be provided by the producer or Contractor, except that truck scales are not required where the material is weighed at properly calibrated automatic batching plant facilities which are equipped with digital print-out equipment. The scales shall be of sufficient size and capacity to weigh the heaviest loaded trucks that are used for delivery of the material. All truck scales shall be mounted on solid foundations which will ensure their remaining plumb and level.

A weigh person shall be provided by the producer. The weigh person shall certify that the weight of the material, as determined either by the truck scales or from the digital print-out of the weights, is correct. To signify the certification of weight the weigh person must either sign their full name on each ticket, or if the ticket printer prints the weigh person's full name they must at least initial each ticket.

Each truck shall be weighed empty prior to each load, except at automatic batch plants approved to operate without truck scales. A digital recorder shall be required on all truck scales. The digital recorder shall produce a printed record of the gross, tare and net weights, and the time, date, truck identification and project number. Provision shall be made for constant zero compensation and further provision shall be made so that the scales may not be manually manipulated during the printing process. The system shall be interlocked so as to allow printing only when the scale has come to rest.

In case of a breakdown of the automatic equipment, the Engineer may permit manual operation for a reasonable time, normally not to exceed 48 hours, while the equipment is being repaired.

If material is shipped by rail, the car weight may be accepted provided the actual weight of material only will be paid for. However, car weights will not be acceptable for material to be passed through mixing plants.

Devices, used to meter or measure component or other materials in a simultaneous manner, shall be located so as to be readily accessible and visible to a single Inspector, unless otherwise directed by the Engineer.

Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured at the point of delivery. Vehicles for this purpose may be of any size or type acceptable to the Engineer, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.

When approved by the Engineer, material specified to be measured by the cubic yard (meter) may be weighed and these weights converted to cubic yard (meter)s for payment purposes. Further, when it is impractical to measure the material by weighing, or in its original position, the material will be measured in its final position and adjusted by a volume change factor. These conversion factors will be determined by the Engineer and shall be agreed to by the Contractor before these methods of measurement are used.

When bituminous material is measured by volume, the measured volume at loading temperature shall be converted to volume at 60° F (15° C) using the temperature correction factors in 705 for asphaltic materials and 706 for tar materials, except that when volume is measured by an approved temperature compensated metering device, no further volume correction for temperature shall be required. When bituminous material is measured by weight, the actual specific

gravity, API gravity, or weight per gallon (liter) of the material shall be used to convert the measured weight to volume at 60° F (15° C). The Contractor shall furnish all information necessary as determined solely by the Division to determine the amount of bituminous material actually incorporated into the project.

Net certified scale 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 bituminous material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work.

When bituminous materials are shipped by truck or transport, net certified weights or volume, subject to correction for loss or foaming may be used for computing quantities.

Cement will be measured by the cwt (hundredweight = 100 lb) (kilogram). For the purpose of determining the total amount used in the mixture, one bag of cement shall be considered as weighing 0.94 cwt (42.64 kg), and one barrel of cement shall be considered as weighing 3.76 cwt (175.55 kg).

Timber will be measured by the thousand feet board measure (mfbm) (cubic meters) actually incorporated in the structure. 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.

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gage, 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.

109.2-SCOPE OF PAYMENT:

The Contractor shall receive and accept compensation provided for in the Contract as full payment for furnishing all materials and for performing all work under the Contract in a complete and acceptable manner and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the prosecution thereof, subject to the provisions of 107.20.

If the "Basis of Payment" clause in the Specifications relating to any unit price in the bid schedule requires that the unit price cover and be considered compensation for certain work or material essential to the item, this work or material will not also be measured or paid for under any other pay item which may appear elsewhere in the Specifications, except as provided in 104.6.

When the Contract specifies payment of an item or a portion of an item on a plan quantity basis, the quantities for payment will be those shown on the Plans with deductions from or additions to such quantities resulting from authorized deviations from the Plans.

If the Contractor believes that a quantity which is specified for payment on a plan quantity basis is incorrect, the Contractor may request the Division in writing to check the questionable quantity. The request shall be accompanied by calculations, drawing, or other evidence indicating why the plan quantity is believed to be in error. If the plan quantity is found to be in error, payment will be made in accordance with the corrected plan quantity.

The Division reserves the right to check the quantity of an item which is specified for payment on a plan quantity basis if there is reason to believe that it is inaccurate. If the quantity is found to be in error, payment will be made in accordance with the corrected plan quantity.

Should the Division determine during construction that conditions have varied from those anticipated in design to the extent that actual measurement of a plan quantity item is warranted, the Division will make such measurement, and payment will be based in lieu of the plan quantity.

109.2.1-General Basis of Adjusted Payment:

109.2.1.1-Single Deficiency: In the case of the single characteristic deficiency, the resulting deficiency shall be used directly to determine an adjusted price.

109.2.1.2-Multiple Deficiency: In the case of a multiple deficiency, the related adjusted percentage of contract price as determined by the acceptance plan for each characteristic shall be determined and the resulting percent of contract price to be paid shall be the product of these related adjusted percentages.

109.2.2-Basis of Charges for Additional Testing: When additional acceptance testing is performed by the Division for reworked lots or sublots in accordance with 106.3.1.2, the cost of such testing will be deducted on current estimates from the amount due the Contractor by the Division. The cost of such testing will be determined in accordance with the unit costs per test as shown in Table 9-1, published in MP 109.00.20.

109.3-COMPENSATION FOR ALTERED QUANTITIES:

When the accepted quantities of work vary from the quantities in the bid schedule, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract unit price for the accepted quantities of work done. No allowance except as provided in 104.2 will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor resulting either directly from such alterations or indirectly from unbalanced allocation among the contract items of overhead expense on the part of the bidder and subsequent loss of expected reimbursements therefore or from any other cause.

Increased work involving supplemental agreements will be paid for as stipulated in such agreements. The Contractor shall furnish substantiating data required in the preparation of these agreements.

The "C" values given per gallon of Liquid Asphalt Material is based on the use of an emulsion which is assumed to contain 65% asphalt material and a gallon of emulsion weights 8.43 pounds or a liter of emulsion weights 1.00 kg. If a cut-back asphalt is used "C" as given in the above table must be multiplied by 1.54 to arrive at a modified "C" factor for use in the formula. No change will be made in the Adjustable Material Cost (C) for variations between these assumptions and actual factors.

The adjustable materials costs (C₁) and (C₂) are based on the approved job mix formula for the specific asphalt mixture being placed in accordance with the following formulae:

$$(C_1) = I_b \times A_c \times 1 \text{ ton or } [(C_1) = I_b \times A_c \times 1 \text{ megagram}]$$

Where A_c equals the approved asphalt content expressed in decimals, i.e. 5.8% asphalt content equals 0.058. When reclaimed asphalt pavement (RAP) is used in the mix, A_c is the % virgin or new asphalt added to the mix.

$$(C_2) = I_b \times A_c \times 1.6 \text{ tons/cy or } [(C_2) = I_b \times A_c \times 1.9 \text{ mg/m}^3 \times 1 \text{ meter}]$$

where A_c equals approved asphalt content expressed in decimals and it is assumed that a cubic yard of asphalt treated open-graded free draining base weights 1.6 tons or 1.9 Mg. No change will be made in C₂ for variations between this assumption and the actual factor.

109.11 THROUGH 109.19-BLANK:

109.20-LOAD LIMIT VIOLATIONS AND WEIGH TICKETS:

The Allowable Gross Weight for any vehicle being used to haul materials on publicly maintained highways under the terms of this contract shall be as follows.

Title 23 Code of Federal Regulations, Section 658.17, establishes maximum allowable gross weight on the Interstate System. The maximum allowable gross weight on WV and US Routes will be as established in Chapter 17C, Articles 17 and 17A of the Official Code of West Virginia, as amended. The Public Service Commission, Weight Enforcement Section is responsible for the enforcement of these provisions.

A weigh ticket shall be required with each load of material from a commercial source which would normally have truck scales. This includes, but is not limited to, all asphalt paving materials and all aggregates regardless of the contract pay unit. The weigh ticket shall include gross, tare, and net weights, time and date of loading, Item Number or Description of Materials, Contract Number or Project Number, number of axles on haul unit, license number of haul unit, and signature of the weigher certifying that all information on the ticket is correct. If the weigher's name is printed by the computer on the ticket, then it only needs to be initialed by the weigher.

For material from a commercial source or a batch plant, which would not normally have truck scales, a weigh ticket documenting the tare weight, number of axles on the haul unit, license number of haul unit, date weighed, location of

scales, and signature of the weigher certifying that all information on the ticket is correct, may be supplied for each haul unit as an alternate to the ticket required in the previous paragraph. The tare weight ticket shall be supplied for each contract on a yearly basis and when modifications are made to the vehicle or combination of vehicles. The weight of the material delivered shall be calculated and furnished by the vendor/supplier shipping the material to the project site or DOH facility. This includes, but is not limited to, concrete, structural steel, piling, reinforcing steel and all prepackaged material of known weight, such as cement, grout, fertilizer, lime, abrasives, etc.

If the haul unit is a combination of vehicles, the license number shall be supplied for each component. The tare weight shall be for the complete haul unit.

All weighing shall be done on scales approved and sealed by the West Virginia Division of Labor, Bureau of Weights and Measures. If the scales are moved or upon the request of the Engineer, the scales shall be reapproved and sealed. The Engineer shall be notified of any scale malfunctions. The Division of Highways may, at its option, accept inspection and sealing by out of state agencies when the material is being loaded outside West Virginia.

Any material, covered by this provision, which is delivered without the proper weigh ticket shall not be accepted by the Division of Highways.

Nothing in this provision relieves any party from compliance with the State Law on load limits or any fines which may be assessed for violation of said law.



Transportation > Highways > Materials

Documents

Materials Control, Soils and Testing Division

Compaction

Welcome Page/Main Materials Page

Division Approved Source/Product Listing

Welcome to the Materials Control, Soils and Testing Division (MCS&T) Web Site. We are a Division of the West Virginia Department of Transportation, West Virginia Division of Highways.

Evidence Of Inspection

Our mission purpose is to assure the highest quality of all materials and material processes incorporated into WVDOH projects. We do this through the use of a Quality Assurance System including testing and management of all materials. MCS&T employs a diverse staff including engineers, technicians, geologists, chemists, various transportation workers, and administrative personnel to complete our mission. The WVDOH organizational structure also includes a Materials Section within each District's Construction Section that employs qualified personnel to assist in the Quality Assurance System. Both MCS&T and the District Materials Sections play significant roles in this process.

Maps To Facility

Material Procedures

Material Procedures Updates

We are a central Division located in Charleston, WV. For a map showing directions to our facility use the flyout entitled "Map to Facility". MCS&T is very active in the construction phase of projects. However our function is not exclusive only to construction. Much of the work performed at this Division is involved in the development and maintenance phases of highway work as well.

New Product Evaluation Procedure

Organizational Structure

About This Web Site

Quality Assurance System

This Web Site is designed to provide information about MCS&T. It provides an overview of the primary functions of MCS&T, the organizational structure of the Division, descriptions of various sections within the Division, contact information, and various tools useful in completing the work we do. Hopefully any questions you might have pertinent to MCS&T will be answered in the contents of this site.

Technician and Inspector Certification Program

The "flyouts" on the left side of this site include information pertinent to some of the primary functions of MCS&T. Use them to find out how we conduct business in a number of areas. We have provided contact information here as well.

Tool Box

Upcoming Materials Contracts

If you're interested in any of the work currently underway or have any questions for us, please send us your request.

Address:

Director
Aaron Gillispie
190 Dry Branch Road
Charleston, WV 25306
Phone: 304-558-9892
Fax: 304-558-0253
Email: aaron.c.gillispie@wv.gov



Transportation > Highways > Materials > 713.01.50 - Corrugated Metal Pipe

Documents

713.01.50 - Corrugated Metal Pipe

Compaction

Fabricators-MP 713.01.50
Standard Specifications Section 713

Effective Date: May 1, 2010

Division Approved
Source/Product Listing

Contact: Don Simmons (304) 558-9870
Email: Donald.W.Simmons@wv.gov

Evidence Of Inspection

Materials Code: 1946

Maps To Facility

Material Procedures

Material Procedures
Updates

New Product Evaluation
Procedure

Organizational Structure

Quality Assurance System

Technician and Inspector
Certification Program

Tool Box

Supplier	Source Code	Lab Number
Contech Construction Products - Summit, KY	A017E	1396581A
Contech Construction Products - Charlotte, NC	C381G	1396582A
Contech Construction Products - Greencastle, PA	A017J	1396583A
Contech Construction Products - Mitchell, IN	C381F	1396584A
Contech Construction Products - Winchester, KY	A017B	1396585A
Jenmar Specialty Products - Pounding Mills, VA	J066A	1396586A
Lane Enterprises Inc. - Bedford, PA	L0390	1396587A
Lane Enterprises Inc. - Dublin, VA	L018A	1396588A
Lane Enterprises Inc. - Pulaski, PA	L0860	1396589A

Upcoming Materials
Contracts

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

PROCEDURE FOR THE QUALITY ASSURANCE
OF CORRUGATED METAL PIPE

1.0 PURPOSE

- 1.1 To provide the procedure for the quality assurance of corrugated metal pipe. Quality assurance is comprised of both Quality Control and Acceptance activities. Quality Control is the responsibility of the fabricator and acceptance is the responsibility of the Division. Quality control data developed by the fabricator may be used as acceptance.

2.0 SCOPE

- 2.1 This procedure shall apply to the following material types:

- 1) Metallic coated corrugated steel pipe and pipe arch
- 2) Bituminous coated corrugated steel pipe and pipe arch
- 3) Bituminous coated paved corrugated steel pipe
- 4) Corrugated stainless steel culvert and underdrains
- 5) Corrugated aluminum alloy pipe and pipe arches
- 6) Polymer precoated, metallic coated steel pipe and underdrain
- 7) Other assembled items such as metal coupling bands, fittings, rivets, bolts and nuts, connecting plates, and end sections.

3.0 APPLICABLE SPECIFICATIONS

3.1 All material under this procedure shall meet the requirements of Section 713 of the West Virginia Division of Highways Standard Specifications for Roads and Bridges. This section specifically includes the following AASHTO Specifications for the applicable item:

- 1) M 36
- 2) M 190
- 3) M 196
- 4) M 218
- 5) M 245
- 6) M 246

4.0 PROCEDURE

4.1 A list of approved fabricators will be developed and maintained by the Materials Control, Soils and Testing Division. Fabricators on the approved list will be authorized to ship materials without specific LOT-by-LOT approval by the Division. Those fabricators not on the approved list will be required at the fabricator's expense to obtain LOT-by-LOT inspection and approval by an independent agency acceptable to the Division.

4.2 To qualify for the approved list, the fabricator must comply with the following:

4.2.1 It is the fabricator's responsibility to assure that all materials used in the process comply with applicable specifications. The fabricator will obtain and maintain ready for review test records from the manufacturers of component materials (and from the precoater, if applicable) necessary to confirm compliance with specifications. The Division will be supplied copies of test data upon request.

- 4.2.2 The fabricator shall submit to Materials Control, Soils and Testing Division a Quality Control Plan detailing how the product will be controlled. As a minimum, the Plan shall include the following:
- Name of company employee responsible for Quality Control. Tests to be conducted and their frequencies (see Attachment 1). Procedure for disposition of noncomplying materials.
- 4.2.3 Upon approval of the Quality Control Plan by Materials Control, Soils and Testing Division, the fabricator will be assigned a laboratory number and be placed on the approved list. Approved fabricators shall maintain and have ready for review the results of testing conducted in accordance with the Quality Control Plan.
- 4.3 For fabricators not on the approved list, corrugated metal pipe must be inspected, tested, and approved prior to shipment by an independent inspection agency acceptable to the Division (see Attachment 2 for frequencies). The inspection will be arranged and paid for by the fabricator.
- 4.4 The acceptance plan for fabricators on the approved list requires submittal of a Certificate of Compliance with each shipment of pipe (see 5.1 for details), and inspection by the Division at the fabricating facility at least once per year. The Division's inspection will cover the following:
- 4.4.1 The fabricator's Quality Control Program will be reviewed for compliance with his Quality Control Plan.
- 4.4.2 Samples of base metal will be taken by the Division. Two samples per gauge from each type of metallic coated stock (100mm x width of coil) will be randomly selected for physical and chemical analysis. These samples will be selected from flat sheet or coils of the same material used in fabrication of the pipe. Connecting band base metal will be represented by the base metal samples. Accessories for connecting bands - such as bolts, angles, bars, etc. - will be sampled per item.

- 4.4.3 Inspection of welded seam pipe will be done at the fabricator's storage site and will be done in accordance with the requirements of AASHTO M 36. The seams will be visually inspected throughout the length of the pipe to determine any visible indications of weld defects. When welded seam pipe is fabricated without reformed ends, the fabricator will conduct, in the presence of the Division's representative, the weld seam cup test procedure as required by AASHTO T 241. The number of pipe selected for this inspection will be three 6.1 m sections of different diameters. These dimensions will be randomly selected.
- 4.4.4 Inspection of lock seam pipe will be at the fabricator's storage site and will be in accordance to AASHTO M 36. The seams will be visually inspected throughout the length of pipe to determine the workmanship of the seam. Lock seam samples will be taken from available pipe and will be tested by the Division in accordance to AASHTO T 249 and shall meet the requirements of AASHTO M 36.
- 4.4.5 One polymer precoated stock sample 610 mm by the coil width of one gauge will be selected at random for tests by the Division. The testing will be in accordance with the requirements of AASHTO M 246.
- 4.4.6 The inspection of the fabricated polymer precoated corrugated steel pipe will be in accordance with the fabrication requirements of AASHTO M 245. A minimum of one 6.1m length of any diameter of this pipe will be randomly selected for this inspection. When applicable, lock seam samples will be taken by the Division.
- 4.4.7 Asphalt coated corrugated steel pipe will be inspected in accordance with AASHTO M 190, except that a minimum of five pipe sections will be sampled for asphalt stripping. Samples of asphalt taken from the five pipes will be combined into a single test sample. This sample will be tested by the Division in accordance with AASHTO M 190.

4.4.8 The Division representative will conduct an imperviousness test in accordance with AASHTO M 190 on one section of pipe.

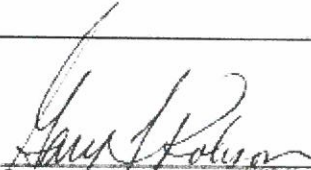
4.4.9 If the documentation of Quality Control data is not maintained, or if inspection or tests of pipe reveal noncompliance with the specifications, the fabricator will be removed from the approved list of fabricators. Until correction of all deficiencies can be documented to the satisfaction of the Division, the fabricator will be required to comply with Section 4.3. The fabricator may request that the Division make a reinspection after he has reestablished his Quality Control.

5.0 SHIPPING DOCUMENTATION

5.1 The fabricator shall furnish with each shipment a signed Certificate of Compliance. The original certificate will accompany the pipe to the project site or other location as applicable. A copy of the certificate will be forwarded directly to Materials Control, Soils and Testing Division. This document attests that the shipment meets the chemical, physical, manufacturing, and fabricating requirements as given in the specifications, and shall include the following information (whichever is applicable):

- 1) Date of Certification
- 2) State Project or Purchase Order Number
- 3) County
- 4) Fabricator's Order Number
- 5) Consignee
- 6) Item Reference (Number and Length of Pieces)
- 7) Diameter and Size
- 8) Gauge of Material
- 9) Heat Number
- 10) Type of Pipe (To Include Type of Metallic Coating and Asphalt Coating When Applicable)
- 11) Corrugation Size
- 12) Quantity (Total Linear Feet)
- 13) Quantity and Type of Connecting Bands
- 14) End Sections, Fittings, Etc.
- 15) Division Assigned Approved List Number (When Applicable)

- 5.2 Fabricators not on the approve list shall submit, in addition to the information required by Section 5.1, the independent inspection agency test results for each shipment. The original certificate will accompany the pipe to the project site or other location as applicable. A copy of the certificate will be forwarded directly to Materials Control, Soils and Testing Division.
- 6.0 PROCEDURES AT THE DELIVERY SITE
- 6.1 Division personnel will determine if the information on the Certificate of Compliance, as required in Section 5.1, agrees with the shipment it accompanies. If not, a corrected Certificate of Compliance will be required.
- 6.2 Division personnel will complete a visual inspection of the shipment for evidence of damage during shipment. Material which has been damaged or does not meet the specifications will be rejected.
- 7.0 DIVISION DOCUMENTATION
- 7.1 After the items on the shipment have been verified as in 6.1 and 6.2, a copy of the Certificate of Compliance indicating acceptance by the project will be forwarded to the Materials Control, Soils and Testing Division through the District Materials Section. If from an unapproved source, the documents will be reviewed by the Materials Control, Soils and Testing Division and a laboratory number assigned.


Gary L. Robson, Director
Materials Control, Soils
and Testing Division

GLR:b

Attachments

**CORRUGATED METAL PIPE
 TESTS AND FREQUENCY FOR
UNAPPROVED CMP FABRICATION PLANTS**

Metallic Coated Corrugated Steel Pipe, Corrugated Alloy Pipe
 and Polymer Precoated Corrugated Pipe

The tests and frequencies are based on shipping LOT.

<u>Item - Test</u>	<u>Frequency</u>
Sheet or Coil - thickness	3 per heat
Coating on Sheet or Coil - thickness	3 per heat
Pipe dimensions	10%
Pipe - arch dimensions	10%
Corrugation - measurements	10%
Workmanship - visual	50%
Seams Welded - visual & test	10%
Seams Lock - visual	50%
End Finish - visual	10%
Coupling Bands - visual	10%
Thickness - measure	10%
Dimensions - measure	10%
Repair of Damaged Metallic Coating - visual	100%
Degree of Surface Cleaning	When Applicable
Thickness of Repair Coating	100%
Underdrain - visual	20%
Size of Perforations	10%
Rows of Perforations	10%
Slotted Drain - visual	10%
Slot Height - measurements	10%
Slot Width - measurements	10%
Bar Thickness - measurements	10%
Weld Size	10%
Bituminous Coated Products	
Coating Thickness - measurements	10%
Paving Thickness - measurements	10%
Properties of Coatings taken from Pipe	
*1 Sample from 10% of Pipe	*
Imperviousness Test	One/Shipment
Other Items	10%

 Signed by
 Consultant & Firm

CORRUGATED METAL PIPE
TESTS AND FREQUENCY FOR
APPROVED CMP FABRICATION PLANTS

Metallic Coated Corrugated Steel Pipe, Corrugated Alloy Pipe
and Polymer Precoated Corrugated Pipe

The tests and frequencies are based on a daily quality control basis and are considered minimum.

<u>Item - Test</u>	<u>Frequency</u>
Sheet or Coil - thickness	1 per heat
Coating on Sheet or Coil - thickness	1 per heat
Pipe - dimensions	Measurements or visual inspection on the applicable items a minimum of once per day for each pipe size as well as for each gauge of metal
Gauge of Pipe	
Corrugation - arch dimensions	
Workmanship - visual	
Seams Welded - visual and test	
Seams Lock - visual	
End Finish - visual	
Coupling Bands - visual	Measurements or visual inspection on the applicable items once/day for production
Thickness - measure	
Dimensions - measure	
Repair of Damaged Metallic Coating - visual	Once per day if applicable
Degrees of Surface Cleaning	
Thickness of Repair Coating	
Underdrain - visual	Once per day if applicable
Size of Perforations - measurements	
Rows of Perforations - visual	
Slotted Drain - visual	
Slot Height - measurements	
Slot Width - measurements	
Bar Thickness - measurements	
Weld Size	
Bituminous Coated Products	Once per each day of operation
Coating Thickness - measurement	
Paving Thickness - measurement	
Properties of Coatings taken from Pipe	Quarterly Once/Year
Imperviousness Test	
Other Items	Once per day if applicable

Company to retain this document for two years.

Signed by

SECTION 713 METAL PIPE

713.1-BLANK

713.2-METALLIC COATED CORRUGATED STEEL PIPE AND PIPE

ARCH:

Metallic coated corrugated steel pipe and pipe arch shall conform to the requirements of AASHTO M 36 for Type I and Type II pipe.

Special sections, such as elbows, for these conduits shall be of the same gage as the conduit to which they are jointed, and shall conform to the applicable requirements of AASHTO M 36.

713.3-BITUMINOUS COATED CORRUGATED STEEL PIPE AND PIPE

ARCH:

Bituminous coated corrugated steel pipe, pipe arches, coupling bands, elbows, and other special sections shall conform to the requirements of AASHTO M 190. Coating and invert paving shall be of the type specified.

713.4-FULL BITUMINOUS COATED AND FULL PAVED CORRUGATED STEEL PIPE:

The pipe shall conform to the applicable requirements of AASHTO M 190 and in addition thereto, when riveted corrugated steel pipe is used, the rivets shall be placed on the outside crests of corrugations. Bituminous coating shall be in accordance with the requirements for Type A; the paving shall be in accordance with the requirements for Type B except that the pavement shall be formed on the inside for the entire circumference of the pipe. Smooth lined pipe over 30 inches (750 mm) in diameter shall have lifting lugs attached to each section when manufactured.

713.5-FIBER BONDED FULL BITUMINOUS COATED CORRUGATED STEEL PIPE AND PIPE ARCH:

713.5.1-Type A, Fiber Bonded Full Bituminous Coated: Fiber bonded full bituminous coated conduits shall comply with the requirements of AASHTO M 36 for base metal, and fabrication where applicable. The conduit shall be formed from sheets which have been coated on both sides with a layer of aramid fibers, applied in a sheet form by pressing them into a molten metallic bonding medium. Immediately after the metallic bond has solidified, the fibers shall be thoroughly saturated with a bituminous saturant. The finished sheets shall be of first class commercial quality, free from blisters and unsaturated spots. In addition, the conduit shall be coated inside and out with a bituminous material complying with the requirements of AASHTO M 190, Type A.

713.5.2-Type C, Fiber Bonded Full Bituminous Coated and Paved Invert: Fiber bonded full bituminous coated and paved conduits shall comply with all the requirements of 713.5.1 and shall be paved to conform with the requirements in AASHTO M 190, Type C.

713.6-FIBER BONDED FULL BITUMINOUS COATED AND FULL PAVED CORRUGATED STEEL SEWER PIPE:

Fiber bonded full bituminous coated and full paved steel sewer pipe shall comply with the requirements of 713.5.1, where applicable, and in addition thereto, the rivets shall be placed on the outside crests of the corrugations and the inside of the pipe shall be paved so that a smooth surface will be formed filling the corrugations of the pipe with a minimum thickness of $\frac{1}{8}$ in. (3 mm) over the crests of the corrugations. Smooth lined pipe over 30 inches (750 mm) in diameter shall be provided with lifting lugs for each section when manufactured.

713.7-CORRUGATED STAINLESS STEEL CULVERTS AND UNDERDRAINS:

Corrugated stainless steel culverts and underdrains shall comply with the requirements of zinc coated (galvanized) corrugated iron or steel culverts and underdrains, AASHTO M 36, with the following exceptions (Numbers refer to Subsections in AASHTO M 36):

1. SCOPE

1.1 This specification covers corrugated stainless steel culverts and underdrains.

3. IRON OR STEEL SHEETS:

3.1 The stainless steel sheets shall conform with the requirements of SAE Standard J-405B, Alloy Grade SAE 51409.

6. SHEET MANUFACTURER'S GUARANTEE:

6.1 The manufacturer of the sheets shall submit with the certified analysis a guarantee providing that all metal furnished conforms with the Specification requirements, shall bear a suitable identification brand or mark, and shall be replaced without cost to the purchaser when not in conformity with the specified analysis and sheet thickness; and the guarantee shall be so worded as to remain in effect as long as the manufacturer continues to furnish material.

7. RIVETS:

7.1 Rivets shall conform to the requirements of SAE Standard J-405B, Alloy Grade SAE 51430, or ASTM A 276, Type 430.

10. CORRUGATIONS:

Corrugations shall be annular, spiral or a combination of annular and spiral.

12. RIVETED SEAMS:

12.2 For pipe with 1 in. (25 mm) deep corrugations, $\frac{1}{2}$ in. (12 mm) diameter bolts and nuts conforming to the requirements of ASTM A 276, Type 430, may be used in lieu of rivets or spot welds on a one-for-one replacement ratio.

In Table 2, substitute sheet thickness as follows:

.048 (1.2 mm)	.105 (2.7 mm)
.060 (1.5 mm)	.135 (3.4 mm)
.075 (1.9 mm)	.164 (4.2 mm)

15. RESISTANCE SPOT WELDED SEAMS:

15.1.2 The welding shall be performed in such a manner that (1) the exterior surfaces of 90 percent or more of the spot welds on a length of pipe shall show no evidence of burning of the metal. Discoloration of the spot weld surfaces will not be cause for rejection.

15.3.5 In Table 3, substitute sheet thickness as follows:

Inches (mm) (Approx.)	Pounds (Mg)
.048 (1.2 mm)	3,100 (1.40)
.060 (1.5 mm)	4,100 (1.85)
.075 (1.9 mm)	5,200 (2.36)
.105 (2.7 mm)	7,000 (3.17)
.135 (3.4 mm)	8,500 (3.85)
.164 (4.2 mm)	10,000 (4.52)

19. TYPE III PIPE:

19.1 Culverts furnished under this type shall consist of stainless steel corrugated metal pipe to be used in underdrains. Unless otherwise specified the pipe shall be perforated.

21. COUPLING BANDS:

21.1 Revise third sentence as follows: The coupling bands shall be made of base metal conforming to SAE Specification J-405B, Alloy Grade 51409.

23. WORKMANSHIP:

23.1.10 Delete this Subsection.

24. REPAIR OR DAMAGED SPELTER COATING:

Delete this Subsection.

25. Add the following notation: This Section applies only with reference to those factors applicable to a stainless steel sheet.

713.8-STRUCTURAL PLATE FOR PIPE, PIPE ARCH, AND ARCHES:

These conduits, and bolts and nuts for connecting plates, shall conform to the requirements of AASHTO M 167.

713.9-FULL BITUMINOUS COATED STRUCTURAL PLATE PIPE, PIPE ARCH, AND ARCHES:

These conduits shall conform to the requirements of AASHTO M 167 and shall be coated with bituminous material. When the coating can be applied in the shop it shall conform to the requirements of AASHTO M 190, Type A Coating. When the coating must be applied in the field the coating shall conform to the requirements of AASHTO M 243. The bituminous coating shall coat the entire inside and outside of the pipe and is not required between the metal sheets at the splices.

713.10-STAINLESS STEEL STRUCTURAL PLATE PIPE:

Stainless steel structural plate pipe shall comply with the applicable requirements of structural plate pipe, AASHTO M 167, with the following exceptions (Numbers refer to Subsections in AASHTO M 167):

1. SCOPE:

This specification covers stainless steel structural plate pipe.

2. BASE METAL:

The stainless steel sheets shall conform with the requirements of SAE Standard J-405B, Alloy Grade SAE 51409.

4. GAGE DETERMINATIONS AND TOLERANCE:

In Table II substitute as follows:

Gage	Sheet Thickness (Inches)	Tolerance Under
1	.276 (7 mm)	.012 (300 μm)
3	.245 (6.2 mm)	.012 (300 μm)
5	.215 (5.5 mm)	.012 (300 μm)
7	.184 (4.7 mm)	.012 (300 μm)
8	.164 (4.2 mm)	.012 (300 μm)
10	.135 (3.5 mm)	.012 (300 μm)
12	.105 (2.7 mm)	.012 (300 μm)

8. CERTIFIED ANALYSIS AND GUARANTEE:

The manufacturer of the sheets shall submit with the certified analysis a guarantee providing that all metal furnished conforms with the specification requirements, shall bear a suitable identification brand or mark, and shall be replaced without cost to the purchaser when not in conformity with the specified analysis and sheet thickness; and the guarantee shall be so worded as to remain in effect as long as the manufacturer continues to furnish material.

10. BOLTS AND NUTS FOR CONNECTING PLATES:

Material for bolts and nuts shall conform to the chemical and mechanical requirements of ASTM A 276, Type 431, Condition T. Size and geometric configuration shall conform to the applicable requirements of ASTM A 325, Paragraph 5.

713.11-METALLIC COATED CORRUGATED STEEL UNDERDRAIN

PIPE:

Metallic coated corrugated steel underdrain pipe shall conform with the requirements of AASHTO M 36 Type III.

713.12-BITUMINOUS COATED CORRUGATED STEEL UNDERDRAIN

PIPE:

This pipe shall conform to the requirements of AASHTO M 36, Type III, and shall be coated with bituminous material conforming to the requirements of AASHTO M 190, Type A coating, except that the minimum coating thickness, shall be 0.03 in. (750 μ m) Coupling bands shall be fully coated. The specified minimum diameter of perforations shall apply after coating.

713.13-BLANK

713.14-CORRUGATED ALUMINUM ALLOY PIPE AND PIPE ARCHES:

Corrugated aluminum alloy pipe and pipe arches shall conform to the requirements of AASHTO M 196, Type I and II. Helically corrugated aluminum alloy culvert pipe shall conform to the requirements of AASHTO M 211.

Certification from the manufacturer will be the basis of acceptance for band material and rivets used in the fabrication.

**713.15-BITUMINOUS COATED CORRUGATED ALUMINUM ALLOY
PIPE AND PIPE ARCHES:**

Bituminous coated corrugated aluminum alloy pipe, pipe arches, coupling bands, elbows, and other special sections shall conform to the requirements of AASHTO M 190. Coating and invert paving shall be of the type specified.

713.16-CORRUGATED ALUMINUM ALLOY PIPE UNDERDRAIN:

Corrugated aluminum alloy pipe underdrain shall conform to the requirements of AASHTO M 196, Type III.

**713.17-BITUMINOUS COATED CORRUGATED ALUMINUM ALLOY
PIPE UNDERDRAIN:**

This pipe shall conform to the requirements of AASHTO M 196, Type III, and shall be coated with bituminous material conforming to the requirements of AASHTO M 190, Type A coating, except the minimum coating thickness shall be 0.03 in. (750 μ m) Coupling bands shall be fully coated. The specified minimum diameter of perforations shall apply after coating.

**713.18-ALUMINUM ALLOY STRUCTURAL PLATE FOR PIPE, PIPE
ARCH, AND ARCHES:**

These conduits and the bolts and nuts for connecting plates shall conform to the requirements of AASHTO M 219.

**713.19-FULL BITUMINOUS COATED ALUMINUM ALLOY
STRUCTURAL PLATE PIPE, PIPE ARCH, AND ARCHES:**

These conduits shall conform to the requirements of AASHTO M 219 and shall be coated with bituminous material conforming to the requirements of AASHTO M 190, Type A coating.

713.20-END SECTIONS FOR CORRUGATED STEEL PIPE AND PIPE ARCHES:

End sections for corrugated iron or steel pipe and pipe arches shall be of the thickness recommended by the manufacturer, and they shall conform to the applicable requirements of AASHTO M 36 and the details shown on the Plans.

713.21-END SECTIONS FOR CORRUGATED ALUMINUM ALLOY PIPE AND PIPE ARCHES:

End sections for corrugated aluminum alloy pipe and pipe arches shall be of the thickness recommended by the manufacturer and they shall conform to the applicable requirements of AASHTO M 196 or M 211 and the details shown on the Plans.

713.22-BLANK

713.23-PRECOATED, METALLIC COATED STEEL PIPE AND UNDERDRAIN:

Precoated sheets shall have a Type B coating conforming with the requirements of AASHTO M 246. The minimum thickness shall be 10 mils (250 μm) on the inside and 3 mils (75 μm) on the outside of the pipe.

Precoated, metallic coated steel pipe and underdrain shall conform to the requirements of AASHTO M 245 with the following exceptions (numbers refer to subsections of AASHTO M 245).

- 19.1 Coupling bands, conforming to the requirements of AASHTO M 218, will not require organic coating.
- 22.1.1 Damaged areas of spelter coating shall be painted in this sequence:
 - 1. Zinc rich primer conforming to Section 711.21.
 - 2. Red oxide lacquer primer.
 - 3. Lacquer.
- 22.1.2 Areas of damaged polymeric coating only shall be painted in this sequence after the areas are rubbed with commercially available acetic acid (such as vinegar) and dried:
 - 1. Red oxide lacquer primer.
 - 2. Lacquer.

The primer and lacquer as specified above must be mutually compatible when applied and compatible with the polymeric coating. The red oxide primer and lacquer, which are commercially available, shall be allowed to completely dry between coats and before handling and backfilling. If the lacquer is applied from a spray can, a minimum of two coats is required. The first coat should provide a light covering, and the second coat should be applied heavily just to the point of running.

713.24-ALUMINUM COATED CORRUGATED STEEL PIPE AND PIPE ARCH:

These conduits shall conform to AASHTO M 36 requirements for aluminum coated or aluminum-zinc coated corrugated steel pipe and pipe arch.