

CITY OF FAIRBANKS

1985

**STANDARD
SPECIFICATIONS**

FOR

**ROADWAY AND UTILITY
CONSTRUCTION**

BOOK NO. _____

FORWARD

This book has been prepared to provide a compilation of Standard Specifications for insertion by reference to the City of Fairbanks' Construction Contracts.

The requirements in the Specifications may be revised or amended from time to time by Supplemental Specifications or by Special Provisions applicable to the specific contract. Reference, by date and title, will be made to the governing provisions on contract documents.

Date: January 16, 1984

JOHN C. PHILLIPS
City Engineer

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PART I

GENERAL CONDITIONS

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DIVISION 100 - GENERAL CONDITIONS

SECTION 101 DEFINITIONS AND TERMS

Wherever in these specifications or in other Contract documents the following terms or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

101—1.01 Abbreviations: Wherever the following abbreviations are used in these specifications or on the plans, they are to be construed the same as the respective expression represented:

AAN	American Association of Nurserymen
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGC	Associated General Contractors of America
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute
API	American Petroleum Institute
ARA	American Railroad Association
ARBTA	American Road Builders and Transportation Association
AREA	American Railway Engineering Association
ARR	Alaska Railroad
ASCE	American Society of Civil Engineers
ASDS	Alaska Sign Design Specifications
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASLA	Alaska Society of Landscape Architects
ASTM	American Society of Testing and Materials
ATM	Alaska Traffic Manual
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
BLM	Bureau of Land Management, Department of Interior
CRSI	Concrete Reinforcing Steel Institute
DOT/PF	Alaska Department of Transportation and Public Facilities
FHWA	Federal Highway Administration, Department of Transportation
FSS	Federal Specifications and Standards, General Services Administration
IEEE	Institute of Electrical and Electronics Engineers
IPCEA	Insulated Power Cable Engineers Association
ITE	Institute of Traffic Engineers
NBFU	National Bureau of Fire Underwriters
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
RCA	Radio Corporation of America
SAE	Society of Automotive Engineers
UBC	Uniform Building Code
UL	Underwriters Laboratory

All references to codes, specifications, or publications promulgated by the above shall be the edition current as of the date of the project advertisement.

101—1.02 "Act of God"

An earthquake, flood, cyclone, or other cataclysmic phenomenon of nature.

101—1.03 "Addendum"

Any written or graphic modification or correction of the bid or contract document issued by the Engineer prior to bid opening.

101—1.04 "Advertisement"

The public announcement, as required by law, inviting bids for work to be performed or materials to be furnished.

101—1.05 "Authorized Project Representative"

The Engineer's authorized representative assigned to make detailed inspections of contract performance.

101—1.06 "Award"

The acceptance of a bid by the Owner.

101—1.07 "Bid Bond"

The form of security approved by the Owner, and furnished by the Contractor, guaranteeing that he/she will enter into Contract in accordance with the Contract documents if his/her proposal is accepted. Also called "Bid Guaranty" and "Bid Security".

101—1.08 "Bidder"

Any individual, firm or corporation formally submitting a proposal for the Work contemplated, or any portion thereof, acting directly or through an authorized representative.

101—1.09 "Calendar Day"

Every day shown on the calendar beginning and ending at mid-night.

101—1.10 "Change Order"

A written order to the Contractor signed by Contractor, Engineer, and Owner authorizing an addition, deletion, or revision of the Work within the general scope of the Contract, or an adjustment in the Contract price or time.

101—1.11 "Consulting Engineer"

An engineering firm retained by the Owner to provide professional services in connection with the design, construction contract administration, or other facet of the Project with the duties and limitations as described in the General Conditions or elsewhere in the Contract.

101—1.12 "Contract Documents"

The agreement, addenda, instructions to bidders, Contractor's proposal, all bonds, notice of award, notice to proceed, general conditions, technical conditions, supplemental conditions, plans, change orders, field orders and all other modifications of such documents entered into in accordance with the Contract.

101—1.13 "Contract Item (Pay Item)"

A specifically described item of work for which a price is provided in the Contract.

101—1.14 "Contract Price"

The total amount payable to the Contractor for the Work to include all sales, use or other consumer taxes related to the Work.

101—1.15 "Contract Quantity"

The Bid Items designated on the Bid Schedule that are not measured for payment in the field but are paid for using the estimated quantities listed unless changes in the work are directed by the Engineer in writing that would change the quantities.

101—1.16 "Contract Time"

The number of calendar days allowed for completion of the Contract, including authorized time extensions.

When a completion date is specified in the Contract, the Contract shall be completed by that date, except as otherwise provided in the Contract.

101—1.17 "Contractor"

The individual, firm, corporation or any acceptable combination thereof, contracting with the Owner for performance of the prescribed Work.

101—1.18 "Dispute"

Lack of agreement between any parties that have any obligations, duties, or responsibilities under the terms of the Contract.

101—1.19 "Engineer"

The City Engineer of the City of Fairbanks, Alaska, acting directly or through the Consulting Engineer or other authorized representative(s) who is responsible for engineering supervision of the construction and the Contract.

101-1.20 "Equipment"

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

101-1.21 "Extra Work"

An item of Work not provided for in the Contract as awarded but found essential by the Engineer for the satisfactory completion of the Contract within its intended scope.

101-1.22 "Extra Work Order"

A written change order issued by the Engineer authorizing the performance of Work or furnishing of materials involving extra work and establishing the basis of payment, time adjustment, and specification change for said extra work.

101-1.23 "Field Order"

A written order to the Contractor interpreting the Work but not affecting the Contract price or time.

101-1.24 "Highway, Street or Road"

A general term denoting a public way for the purpose of vehicular and/or pedestrian travel, including the entire area within the right of way.

101-1.25 "Holidays"

For the City of Fairbanks holidays occur on:

1. New Year's Day - January 1
2. Washington's Birthday - Third Monday in February
3. Memorial Day - Last Monday of May
4. Independence Day - July 4
5. Labor Day - First Monday in September
6. Alaska Day - October 18
7. Veteran's Day - November 11
8. Thanksgiving Day - Fourth Thursday in November
9. Christmas nay - December 25
10. Every Sunday
11. Every day designated by public proclamation by the President of the United States or the Governor of the State as a legal holiday.

If any holiday listed above falls on a Saturday, Saturday and the preceding Friday are both legal holidays. If the holiday should fall on a Sunday, except (10) above, Sunday and the following Monday are both legal holidays.

101-1.26 "Inclement Weather"

Any weather conditions so extraordinary that previous climatic conditions in the locality of the Work afford no reasonable warning of them.

101-1.27 "Major Contract Item"

Any Contract pay item for which the product of the bid quantity and the bid price equals ten percent (10%) or more of the total contract price.

101-1.28 "Minor Contract Item"

Any Contract pay item for which the product of the bid quantity and the bid price equals less than 10 percent of the total contract price.

101-1.29 "Materials"

Any substances specified for use in the construction of the project and its appurtenances.

101-1.30 "Notice of Award"

The written notice given by the Owner to the Contractor accepting the bid of the Contractor.

101-1.31 "Notice to Proceed"

The written notice given by the Owner to the Contractor fixing the date on which Contractor shall commence to perform his/her obligations under the Contract.

101-1.32 "Owner"

The City of Fairbanks, Alaska acting through its designated representative. 101-1.33 "Original Ground (OG)"

The ground surface prior to the initiation of the proposed Work.

101-1.34 "Payment Bond"

The form of security, approved by the Owner, furnished by the Contractor and his/her surety guaranteeing the payment of debts covered by the bond.

101-1.35 "Performance Bond"

The form of security approved by the Owner, furnished by the Contractor and his/her surety guaranteeing the complete and faithful performance of all of the obligations and conditions placed upon the Contractor by the Contract.

101-1.36 "Plans"

The approved plans, profiles, typical cross sections, working drawings and supplemental drawings, or reproductions thereof, which show the location, character, dimensions, and details of the Work to be done.

101-1.37 "Pre-Bid Conference"

A meeting between the Owner, Engineer, and prospective bidders for submission of questions with regards to the project, documents, and other factors affecting the bid prior to bid opening. All questions are responded to only in writing.

101-1.38 "Pre-Construction Conference"

A meeting between the Contractor and the Engineer to discuss the project before the Contractor begins work.

101-1.39 "Product Data"

Complete catalog data for the manufactured items of equipment and all component parts, including specific performance data, material description and source, rating, capacity, working pressure, material gauge or thickness, brand name, catalog numbers, dimensions, installation instructions, and other necessary information.

101-1.40 "Profile Grade"

The trace of a vertical plane intersecting the top surface of the layer shown on the typical section, usually along the longitudinal centerline of the road bed. Profile grade means either elevation or gradient of such trace according to the context.

101-1.41 "Project"

The roadway, building or other construction together with all appurtenances described by the Contract on which the Contractor will be performing the Work.

101-1.42 "Proposal"

The offer of a bidder, on the prescribed form(s), to perform the Work for the price(s) quoted. Also called "Bid".

101-1.43 "Right-of-Way (ROW)"

A general term denoting land, property, or interest therein, usually in a strip acquired for or devoted to a roadway or utility.

101-1.44 "Shop Drawings"

All diagrams, drawings, illustrations, brochures, schedules, and all other data or submittals required by the Contract to be furnished by the Contractor illustrating fabrications, installation, dimensions, and other aspects of the Work.

101-1.45 "Specifications"

A general term applied to all directions, provisions and requirements pertaining to performance of the Work.

101-1.46 "Subcontractor"

An individual, firm, or corporation to whom the Contractor sublets part of the Contract.

101-1.47 "Substantial Completion"

The date as certified by the Engineer when the work, or a specified part thereof, is sufficiently completed in accordance with the Contract, so that the project, or a specified part, can be used for the purposes for which it was intended.

101-1.48 "Superintendent"

The Contractor's representative in responsible charge of the Work, who shall be authorized to receive and execute work orders and directions of the Engineer.

101-1.49 "Surety"

The corporation, partnership or individual, other than the Contractor, executing a bond furnished by the Contractor.

101-1.50 "Time Limit"

The period of time within which all or a portion of the Work must be completed. All time limits stated in the Contract are of the essence of the Contract.

101-1.51 "Traveled Way"

The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

101-1.52 "Work"

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

101-1.53 "Work Order"

A written order, signed by the Engineer, requiring performance of the Work under and within the terms of the original Contract by the Contractor without negotiation of any sort.

101-1.54 ASSUMED REFERENCE

In order to avoid cumbersome and confusing repetition of expressions in these specifications, it is provided that wherever anything is, or is to be done, if, as, or, when, or where "contemplated, required, determined, directed, specified, authorized, ordered, give, necessary, deemed necessary, permitted, reserved, suspended, established, approval, approved, disapproved, acceptable, unacceptable, suitable, accepted, satisfactory, unsatisfactory, sufficient, insufficient, rejected, or condemned," it shall be understood as if the expression were followed by the words "by the Engineer" or "to the Engineer".

END OF SECTION

SECTION 102 AWARD AND EXECUTION OF THE CONTRACT

102—1.01 CONSIDERATION OF PROPOSALS

After the proposals are opened and read, they will be compared on the basis of the summation of the products of the approximate quantities shown in the bid schedule by the unit bid prices. The results of such comparisons will be immediately available to the public. In the event of a discrepancy between unit bid prices and extensions, the unit bid price shall govern.

The right is reserved to reject any or all proposals, to waive technicalities or to advertise for new proposals, if in the judgment of the awarding authority the best interests of the Owner will be promoted thereby.

102—1.02 AWARD OF CONTRACT

The Owner reserves the right to accept the total basic bid and any combination of additive and deductive alternatives which best serve the objectives and interests of the City of Fairbanks.

Bidders who maintain a major place of business within the limits of the Fairbanks North Star Borough shall be given consideration as low bidders where their bid is the lessor of five percent (5%) or five thousand dollars (\$5,000.00) in excess of the lowest bid received from firms having a major place of business located elsewhere in Alaska, and/or the lesser of ten percent (10%) or ten thousand dollars (\$10,000.00) in excess of the lowest bid received from firms having no major place of business located within the state. The definition of the term "major place of business" shall be determined by the City Council.

In making the award of the Contract, the Owner reserves the right to take into consideration the plant facilities of the bidder and the bidder's ability to complete the Contract within the time specified in the proposal.

The Owner reserves the right to require that any bidder, before being awarded a Contract, shall execute a non-collusion affidavit in such form as will satisfy the owner that the bid offered is genuine, is not a sham or collusive, and in no respect or degree is made in the interest or on behalf of any person, firm or corporation not named in the proposal containing such bid.

The notice of award, if the Contract be awarded, will be issued within thirty (30) calendar days after the opening of proposals to the lowest responsible and qualified bidder whose proposal complies with all the requirements prescribed. The successful bidder will be notified, by letter mailed to the address shown on his/her proposal, that his/her bid has been accepted and that he/she has been awarded the Contract.

102—1.03 CANCELLATION OF AWARD

The Owner reserves the right to cancel the award of any Contract at any time before the execution of said Contract by all parties without any liability against the Owner.

102—1.04 RETURN OF PROPOSAL GUARANTY

Proposal guaranties, other than bid bonds, will be returned to all bidders, except the three low bidders, as soon as practical after the opening of bids. The bid guaranty of the lowest and the two other bidders will be returned promptly after satisfactory bonds have been furnished and the Contract has been executed.

102—1.05 SURETY BONDS

Each bid must be accompanied by cash, cashier's check of the bidder, or a Bid Bond on a form supplied by the Owner, duly executed by the bidder as principal and having as surety thereon a surety company or individual sureties approved by the Owner in the amount of five percent (5%) of the amount bid.

Simultaneously with his/her delivery of the executed Contract, the Contractor shall furnish a Surety Bond or Bonds on forms supplied by the Owner as security for faithful performance of this Contract, and for the payment of all persons performing labor or furnishing materials in connection with this Contract, each in the penal sum of one hundred percent (100%) of the Contract amount.

The surety on each Bond may be any corporation, or partnership authorized to do business in Alaska as an insurer under Alaska Statute AS 21.09 or two (2) responsible individual sureties approved by the contracting officer. When individual sureties are used, the net worth and the total value of the assets located in Alaska of each individual surety shall not be less than the penal amount of the Bond. In addition, each individual surety must execute an Affidavit of Individual Surety which will be provided upon request by the City. Real property shall be valued at its assessed valuation, proof of which must accompany the affidavit unless a current independent appraisal has been performed in which case the appraisal must accompany the affidavit. Each individual surety affidavit contains a Certificate of Sufficiency which must be signed by a Certified Public Accountant.

Additionally, an individual surety shall provide the City with security equal to one-half the amount of the Bond. The security shall consist of deeds of trust on otherwise unencumbered real property located within the State, or pledges in the case of investment securities, or security agreements in the case of other personal property, which property may not be subject to prior security interests.

When individual sureties are used for the Bid Bond in addition to the Bond, the Proposal shall be accompanied by a postal money order or cashier's check payable to the City of Fairbanks in an amount equal to at least twenty-five percent (25%) of the minimum amount required for the Bid Bond.

No person having any interest or claim to the assets of the person submitting the Proposal may be a surety on a Bid Bond except that stockholders of a corporate principal may be accepted as sureties, provided their qualifications as such are independent of their stockholding therein.

Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified copy of their power of attorney with effective date.

102—1.06 EXECUTION AND APPROVAL OF CONTRACT

The Contract documents shall be correctly completed and signed in quadruplicate by an authorized signatory for the successful bidder and returned together with the required surety bonds within fifteen (15) days after the; notice of award has been received by the bidder. If the Contract is not executed by the Owner within twenty (20) days following receipt from the bidder of the properly signed contracts and bonds, the bidder shall have the right to withdraw his/her bid without penalty. No Contract shall be considered as effective until it has been fully executed by all of the parties thereto.

102—1.07 FAILURE TO EXECUTE CONTRACT

Failure to properly execute and deliver the Contract and file acceptable bonds within fifteen (15) days after the Contract documents have been received by the bidder shall be just cause for the cancellation of the award and the forfeiture of the proposal guaranty which shall become the property of the Owner, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest bidder, or the Work may be re-advertised and constructed under Contract or otherwise, as the Owner may decide.

102—1.08 CONTRACTOR'S UNDERSTANDING

It is understood, and that by careful examination, the Contractor has satisfied himself/herself as to the nature, location and risks inherent in the work, in the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of the equipment and facilities needed preliminary to and during the prosecution of the Work, the general and location conditions and all other matters which can in any way affect the work under this Contract. No verbal agreement or conversation with any officer, agent or employee of the Owner, either before or after the execution of the Contract, shall affect or modify any of the terms or obligations herein contained.

END OF SECTION

SECTION 103 SCOPE OF WORK

103—1.01 INTENT OF CONTRACT

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

103—1.02 ALTERATIONS OF PLANS OR WORK

Owner reserves the right to make, at any time during the construction of the project, such increases or decreases in quantities and such alterations in the details of construction, including alteration of the grade or alignment of roads or structures, or both, as may be found necessary or desirable for completion of the intended facility. Such increases or decreases and alterations shall not invalidate the Contract nor release the surety, and the Contractor agrees to accept and perform the Work, as altered, the same as if it had been a part of the original Contract.

Where such work does not materially differ from specified Contract Work, it shall be measured and paid for at Contract unit prices, except that an increase or decrease of more than twenty-five (25) percent in the quantity of a major Contract item shall be subject to the provisions of Section 108-1.04. If, however, the Work or the unit costs of performance are materially changed, an adjustment in compensation shall be made, as agreed upon by the parties to the Contract.

If an adjustment in compensation cannot be agreed upon, the Engineer may direct the Contractor to proceed with the Work while further negotiations are held. The Contractor shall cooperate with the Engineer in keeping complete daily records of the cost of the Work. In the event that subsequent negotiations fail to produce a mutually acceptable adjustment in compensation, the Work will be paid for as provided in Section 108-1.06. Contract time will be adjusted as provided in Section 107-1.06.

In giving instructions, the Engineer shall have authority to direct minor changes in the Work not involving extra cost, and not inconsistent with the purposes of the Work, but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the Engineer, and no claim for an addition to the Contract Sum shall be valid unless the additional work was so ordered. No deviation from or alteration of the requirements of the Contract will be permitted without the express written approval of the Engineer.

103—1.03 CHANGED CONDITIONS

The Contractor shall promptly, and before such conditions are disturbed, notify the Engineer in writing of: (1) subsurface or latent physical conditions at the site differing materially from those indicated in the Contract, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in this contract, or (3) any errors or omissions in drawings, or in the layout as given by survey points and instructions. The Engineer shall promptly investigate the conditions, and if he/she finds that such conditions do materially so differ and cause an increase or decrease in the Contractors cost of, or the time required for, performance of the Contract, an equitable adjustment shall be made and the Contract modified in writing accordingly.

No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required above; provided, however, the time prescribed therefore may be extended by the Engineer.

No claim by the Contractor for an equitable adjustment hereunder shall be allowed if not asserted in accordance with the requirements of Section 104-1.14.

If the parties are unable to agree on the terms of an equitable adjustment, the Engineer may order such Work done and pay for such Work as provided in Section 108-1.05, and allow such additional time for performance as he/she may deem proper.

103—1.04 EXTRA WORK

Upon written direction by the Engineer the Contractor shall perform Work for which there is no price included in the Contract wherever it is deemed necessary or desirable in order to complete fully the project. Such Work shall be performed in accordance with the specifications and as directed, and will be paid for as provided under Subsection 108-1.05.

103—1.05 SANITARY ARRANGEMENTS

The Contractor shall make arrangements with private residences for toilet facilities or shall provide approved temporary toilet conveniences, properly enclosed, for the use of all workers employed on the project. He shall maintain the same in a sanitary condition from the beginning of the Work until completion and shall then remove and disinfect the premises.

103—1.06 TEMPORARY UTILITIES

All temporary utilities required for the Work shall be provided by the Contractor unless otherwise noted in the plans and specifications.

103—1.07 FINAL TRIMMING OF WORK

The Work to be done under the Contract shall include such repair work as may be necessary to overcome such deterioration as may occur on some portions of the Work, while other portions of the Work are being performed. The project shall be in a neatly trimmed and well-finished condition throughout at the time of completion as a condition for acceptance by the Owner.

103—1.08 CLEANING UP

During construction the Contractor shall maintain the work site in a clean, orderly condition. As a condition of substantial or final completion the Contractor shall remove from the Owner's property, public property, and private property, all temporary structures, rubbish, and surplus or waste materials resulting from his/her operations and leave the site in a condition acceptable to the Engineer.

This requirement shall not apply to property used for permanent disposal of waste materials in accordance with permission for such disposal granted to the Contractor by the Owner thereof.

103—1.09 REMOVAL OF CONTRACTOR'S EQUIPMENT AND MATERIALS

It is understood and agreed that the Contractor is to promptly remove from the project right of way and other property owned or controlled by the Owner all equipment and material that he/she places thereon that is not to become the property of the Owner. It is further understood and agreed

that any such equipment and material of any kind that is not removed as herein provided within thirty (30) days after the date upon which all Work to be done under the Contract is completed and accepted by the Owner, or within such longer time as may be agreed upon in writing between the Contractor and the Owner shall become the property of the Owner and may be used or otherwise disposed of by the Owner without obligation to the Contractor or to any party to whom he/ she may transfer title.

103—1.10 RECORD DRAWINGS

The Contractor shall maintain a "mark-up" set of plans which shall be revised by the Contractor as the work progresses to reflect current conditions. The revisions are to be indicated in a neat, well organized manner and are to include the elevation and plan location of any utilities, structures, etc. encountered or installed.

"Record" survey books will be kept and shall include the following items:

1. The location and elevation of all existing utilities, structures, etc, encountered.
2. The finished product location and elevation of all utilities and structures installed, including but not limited to fire hydrants, catch basin and manhole lids and inverts, and valve boxes.
3. The plan location of pavement patches.
4. A minimum of four swing ties from permanent objects to all valve boxes, pitorifices and thaw wire boxes.

All record notes will be kept in a book(s) designated "Record". No other survey notes will be kept in books designated "Record". Separate record survey books shall be kept for water systems, sewer systems, storm drainage systems, and steam/hot water systems.

The Contractor shall provide the Owner with the mark-up set of drawings with information complete about the horizontal and vertical location of all structures encountered or installed, and copies of all current "Record" notes, with each pay request. Pay will not be processed unless this information is submitted.

The mark-up plans and "Record" books shall become the property of the City prior to final acceptance and payment of demobilization.

END OF SECTION

SECTION 104 CONTROL OF WORK

104—1.01 AUTHORITY OF THE ENGINEER

The Engineer will decide: all questions which may arise as to the quality and acceptability of materials furnished and Work performed; all questions as to the degree of completion 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 Engineer will have the authority to suspend the Work wholly or in part due to the failure of the Contractor to carry out provisions of the Contract; for failure to carry out orders; for such periods as he/she 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. Notification in writing stating the reason for the suspension will constitute sufficient notice.

The Engineer shall have the authority to reject all Work and materials which do not conform to the Contract and to order the suspension of the use of specific construction equipment used in the work in order to protect public and property.

Within a reasonable time after their presentation to him/her, the Engineer shall make decision in writing on all claims of the Contractor and on all other matters pertaining to the execution and progress of the Work or the interpretation of the Contract. All such decisions of the Engineer shall be final unless as otherwise provided for in the contract documents.

The Engineer shall be the Owner's representative during the construction period and shall observe the Work on behalf of the Owner. The Work will not be considered completed until approved and accepted by the Owner.

The Consulting Engineer, if retained to assist with this Project, shall act as the authorized representative of the Engineer to monitor adherence to design and construction contract specifications during the period of construction within the limits of authority set forth in the construction contract documents, but in no event shall the Consulting Engineer have responsibility or authority:

- a. To order changes in construction which will result in additional costs or which will require extensions of construction time;
- b. To suspend all or any portion of a construction contractor's operations except for suspensions of less than twenty-four (24) hours for non-compliance with the contract documents.
- c. To terminate all or any portion of a construction contract;
- d. To accept all or any portion of a construction; or
- e. To operate or maintain any portions of the construction which have been turned over to the Owner for use prior to completion of a construction contract.

Neither the Owner, Engineer, or Consulting Engineer shall have the responsibility to:

- a. Direct any construction contractor or its personnel relative to safety or to the means, methods, techniques, or procedures of construction not required by the specifications.

The Owner, through the Engineer or the Engineer as the Owner's representative, shall furnish drawings and specifications which, as far as practical, completely represent the requirements of the Work to be performed under the Contract. The Contractor shall be supplied with six (6) sets of specifications and prints of the drawings (plans). The Contractor may obtain any additional prints required from the Engineer by compensating the Engineer for the cost of printing involved.

If cross-sections are available, one (1) set shall be supplied to the Contractor upon request.

All drawings, specifications and copies thereof furnished by the Engineer shall not be reused on other Work, and with the exception of the signed Contract, sets are to be returned to him/her upon request at the completion of the Work. All models are the property of the Owner.

After checking and verifying all field measurements, the Contractor shall prepare, approve in writing, and submit with reasonable promptness and in such sequence as to cause no delay in the Work or in the Work of the Owner or any separate Contractor, all shop drawings, product data and samples required by the Contract to be reviewed or tested by the Engineer.

By approving and submitting shop drawings, project data and samples, the Contractor represents that he/she has determined and verified all materials, field measurements, and field construction criteria related thereto, and that he/she has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract and that he/she is satisfied they conform to the Contract.

Unless otherwise provided in the Contract, the Contractor shall submit one (1) reproducible copy and six (6) prints of each shop drawing, four (4) copies of product data sheets and two (2) samples.

All required shop drawings, project data and samples shall be furnished to the Engineer for his/her review and any required testing before any of the Work or related Work is performed or products or material ordered. Any Work performed or products or material ordered prior to the Engineer's review and completion of any testing will be at the Contractor's risk.

The Engineer will review all shop drawings, product data and samples and conduct such tests as are required by the Contract within a reasonable time but in no event will the Engineer be required to complete such review or conduct such tests in less than twenty-one (21) calendar days after receipt.

All shop drawings and product data shall be made in such a manner that fl clear and legible reproductions can be made from them. Any shop drawings, product data, or samples submitted for review which are, in the Engineer's opinion, carelessly prepared, erroneous, or unchecked will be returned to the Contractor for redrawing, checking and re-submission.

Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, the Contractor shall clearly indicate which portion of the contents is being submitted for the Engineer's review.

The Contractor shall direct specific attention, in writing on resubmitted shop drawings, product data or samples, to revisions other than those requested by Engineer on previous submittals.

The Contractor shall direct specific attention, in writing, to each deviation from the Contract requirements and state any trades, dimensions, functions or other aspects of the Work that will be

affected by the proposed change. It is understood that any deviation will be made at no additional cost to the Owner and there will be no extension of the Contract time for such deviation.

The Contractor is responsible for the design of any construction changes resulting from any such deviation, for dimensions which shall be confirmed and coordinated at the job site, for fabrication processes and techniques of construction, for coordinating of the Work with that of all trades and for complete installation which will function as originally specified.

The Engineer will, upon completion of the review, return one (1) copy of all shop drawings, product data and one (1) sample to the Contractor and the Contractor will maintain them together with other submittals, and the Contract documents, in good order, and available to the Engineer and his/her representatives at the construction site.

The Contract bid price shall include the cost of furnishing all shop drawings, product data and samples and the Contractor will be allowed no extra compensation for such drawings, product data, or samples.

The review by the Engineer of any shop drawings, product data, samples, or other submittals is only for conformance with the general design concept of the project and does not extend to consideration of structural integrity, safety, detailed compliance with Contract requirements or any other obligation of the Contractor. Any action shown is subject to the requirements of the plans and specifications. The Contractor is responsible for confirming and correlating all dimensions; fabricating and construction techniques; coordinating his/her Work with that of all other trades; and the satisfactory performance of his/her entire Work in strict accordance with the Contract. The review is undertaken solely to satisfy the Engineer's obligations to the Owner and does not relieve the Contractor from his/her obligation to fully satisfy all Contract requirements, nor shall such review give rise to any right of action or suit in favor of the Contractor or third persons, against the Engineer or the Owner.

104—1.03 CONFORMITY WITH PLANS AND SPECIFICATIONS

All Work performed and all materials furnished shall be in strict conformance with the lines, grades, cross sections, dimensions, procedures, and material requirements, including tolerances, shown on the plans or indicated in the specifications.

All Work which does not conform to the requirements of the Contract will be considered as unacceptable Work.

Unacceptable Work, whether the result of poor workmanship, use of defective materials, damage through carelessness or any other cause, found to exist prior to the final acceptance of the Work, shall be removed immediately and replaced in an acceptable manner at the expense of the Contractor. However, in the event the Engineer finds the material or the finished product in which the materials are used is not in conformity with the plans and specifications, but that reasonably acceptable Work has been produced, he/she shall then make a determination if the Work shall be accepted and remain in place. In this event, the Engineer will document the basis of acceptance by Contract modification which will provide for an appropriate adjustment in the Contract price for such Work or materials as he/she deems necessary to conform to this determination.

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

Upon failure on the part of the Contractor to comply forthwith with any order made under the provisions of this section, the Engineer will have authority to cause unacceptable Work to be remedied or removed and replaced by others and to deduct the cost thereof from any monies due or to become due the Contractor.

104—1.04 COORDINATION OF PLANS AND SPECIFICATIONS

These 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; plans will govern over specifications unless stated otherwise elsewhere in the contract.

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, he/she 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.

The Contractor shall keep at least two (2) complete sets of up-to-date and approved plans and Contract assemblies on the Work at all times.

The Contractor shall give the Work the constant attention necessary to facilitate the progress thereof, and shall cooperate with the Engineer; his/her authorized project representatives, and other Contractors in every way possible.

The Contractor or his/her representatives shall attend all pre-construction and construction conferences called by the Engineer.

104—1.05 COOPERATION BY CONTRACTOR

The Contractor shall have on the Work at all times, as his/her 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 his/her authorized project representatives. The superintendent shall have full authority to supply such materials, equipment, tools, labor and incidentals as may be required. Such superintendence shall be furnished on site irrespective of the amount of Work sublet.

The Contractor shall at all times carry out and fulfill the instructions and directions of the Engineer insofar as the Work to be performed under the Contract is concerned and, in the event the Contractor fails to carry out and fulfill such instructions and directions, the Owner may refuse to make any partial or final payments to the Contractor so long as the Contractor fails or refuses to carry out and fulfill the instructions and directions of the Engineer.

104—1.06 COOPERATION WITH UTILITIES

The Contract will indicate the various utilities known to be within the Work zone and indicate whether they are to remain in place, be adjusted by others, or be adjusted by the Contractor. The locations and elevations of existing underground utilities shown on the plans are approximate only. The elevations of utility services are very uncertain and do not have a constant relationship with the elevation of the utility main lines. Before starting construction at points of possible conflict, the Contractor shall locate and uncover the existing utilities. Should conflicts occur

which are not indicated on the plans, or utilities be discovered that are not shown on the plans, the Contractor shall notify the Engineer who will then investigate and issue instructions to the Contractor.

It is understood and agreed that the Contractor has considered in his/her bid all of the permanent and temporary utility appurtenances in their present or relocated positions as shown on the plans.

At points where the Contractor's operations are adjacent to properties or railway, communications, pipelines, 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.

If not required by the Contract to perform any necessary utility relocation, the Contractor shall cooperate with the owner 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 or rearrangement of 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 utility service as a result of accidental breakage or as a result of being exposed or unsupported, the Contractor shall promptly notify the utility owner and the Engineer. If water or electrical service is interrupted, repair Work shall be continuous until service is restored.

When utilities are damaged by the Contractor, the utility owner has the choice of repairing the utility himself/herself or having the Contractor repair the damage. In any of the following circumstances, the Contractor will reimburse the utility for repair costs or provide at no cost to the utility owner or Owner, all materials, equipment and labor if he/she repairs the damage himself/herself:

1. When the utility is shown on the plans in the substantially correct location.
2. When the utility has been located by the Owner.
3. When no locate was requested by the Contractor.
4. All visible utilities.

The Contractor will not be responsible for the cost of repairing utilities under either of the following circumstances:

1. When the buried utility locations on the plans or the locate are inaccurate by more than five feet (5') horizontally or two and one-half feet (2 1/2') vertically.
2. When the location or existence of the buried utility is unknown by the Engineer or utility owner.

In these cases, any repair Work done by the Contractor will be reimbursed using appropriate bid items or, if there are no appropriate bid items, considered Extra Work and shall be reimbursed in accordance with Section 108-1.05.

When utility service interruptions more than eight (8) hours are authorized, planned, or necessary, the Contractor shall prepare and submit a plan describing the sequence and timing of the interruptions and provide temporary utility service to all affected residences, buildings, and other

users. The Contractor shall submit this plan, describing the utility interruptions and implementation of the temporary utility services, to the Engineer one week prior to the Pre-Construction Meeting. The plan will be reviewed at the Pre-Construction Meeting, revised as necessary, and resubmitted by the Contractor for approval by the Engineer. No construction activities shall commence until a plan approved by the Engineer has been returned to the Contractor.

When any utility service interruptions are authorized as part of the Work, the Contractor shall notify the utility and all affected property owners or tenants forty-eight (48) hours in advance of the interruption. Property owner or tenant notification shall consist of door knob notices, personal contact with written receipt of information, or other methods approved in advance by the Engineer. All requests for utility service interruptions to the Fairbanks Municipal Utilities System shall be made in writing through the Engineer. Requests to other utilities shall be made by the Contractor directly with that utility.

When utility locations are requested of the utility, written requests must be delivered to the utility at least seven (7) days prior to commencement of the Work for which the location is required. The request must be specific as to the area, utilities to be located, and method of marking the located utilities. The cost of repeating requested utility locations shall be borne by the Contractor.

104—1.07 COOPERATION BETWEEN CONTRACTORS

The Owner reserves the right at any time to Contract or arrange for and perform other or additional Work on or near the Work covered by the Contract.

When separate Contracts are let within the limits of any project, or projects the Contractor shall conduct his/her Work so as not to interfere with or hinder the Work being performed by other Contractors. The Contractor shall join his/his Work with that of the others in an acceptable manner and shall perform it in proper sequence to that of others.

If another Contractor or Contractors are working in the same area with equal rights and privileges and are not subject to control by the Owner, it shall be the responsibility of the Contractor to make whatever arrangements with said Contractor as are necessary for the proper execution of the Work.

If any part of the Contractor's Work depends upon the Work of any other Contractor for proper execution or results, the Contractor shall inspect and promptly report to the Engineer any defects in such Work that renders it unsuitable for such proper execution and results. His failure to so inspect and report shall constitute an acceptance of the other Contractor's Work as fit and proper for the reception of his/her Work. To insure the proper execution of his/her subsequent Work, the Contractor shall measure Work already in place and shall report at once to the Engineer any discrepancy between the executed Work and the drawings.

The Contractor shall assume all liability, financial or otherwise, in connection with his/her Contract and shall protect and save harmless the Owner from any and all damages or claims that may arise because of inconvenience, delay, or loss experienced by him/her or other Contractors due to the failure of the Contractor to comply with the requirements of this subsection.

104—1.08 SURVEY CONTROL

Unless otherwise specified the Owner shall furnish the minimum horizontal and vertical control necessary to enable the Contractor to establish the planned lines, grades, and locations. At least fourteen (14) calendar days in advance of the date that the survey control is required, the

Contractor shall notify the Engineer of the area requiring the survey control and the date that the survey control is required.

Owner-established horizontal and vertical control points, reference points for existing monumentation that will be removed in connection with the work, and existing monument at ion in the vicinity of the project not planned for removal, shall be preserved and maintained by the Contractor. The Contractor shall pay the Owner the cost of re-establishing any such control points, reference points or monumentation that are moved or otherwise damaged during the construction of the Work.

104—1.09 AUTHORITY OF THE AUTHORIZED PROJECT REPRESENTATIVE

Authorized project representatives shall be authorized to inspect all Work done and all 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 authorized project representative will report to the Engineer as to the progress of the Work and manner in which it is being performed and advise the Engineer and the Contractor whenever it appears that the material furnished or the Work performed by the Contractor fails to fulfill the requirements of the Contract.

In case of any dispute arising between the Contractor and the authorized project representative as to materials furnished or manner of performing the Work, the authorized project representative shall have authority to reject materials or the Work until the question at issue can be referred to and decided by the Engineer. The authorized project representative is not authorized to revoke, alter, enlarge, relax or release any requirements of the plans and specifications nor to approve or accept any portion of the Work nor to issue instructions contrary to the Contract nor act as superintendent for the Contractor.

The presence or absence of an authorized project representative does not relieve the Contractor from his/her obligation to fully perform all Contract requirements nor does it give rise to any right of action or suit by the Contractor or third persons against the Owner, Engineer or authorized project representative.

No Work shall be deemed acceptable by reason of the presence of an authorized project representative.

104—1.10 INSPECTION OF WORK

The Contractor shall provide authorized representatives and agents of the Owner, financing agencies, U.S. Public Health Service, Permitors, Alaska Department of Labor, and agencies responsible for monitoring compliance with health and safety regulations ready access to and permission to inspect all Work, materials, payrolls, records of personnel, material invoices, and other relevant data and records.

All materials and each part or detail of the Work shall be subject to inspection at any time. The Engineer 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.

If the Engineer requests it, 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, will be at the Contractor's expense.

If the specifications, the Engineer's instructions, laws, ordinances or any public authority require any Work to be specifically tested or approved, the Contractor shall give the Engineer notice of its readiness for inspection in sufficient time to allow inspection by the Engineer; and if the inspection is by authority other than the Engineer, the Contractor shall notify the Engineer of the date fixed for such inspection. In the event any such Work should be covered up without approval or consent of the Engineer, or if any Work is performed at a time not within the Contractor's stated working hours or schedule without advance written notification to the Engineer of said Work, it shall be uncovered by the Contractor for examination if so required by the Engineer. The cost of the uncovering and restoration of the Work in this case shall be at the Contractor's expense whether or not the Work was acceptable unless the Engineer failed to inspect after having been given proper notice.

104—1.11 CONSTRUCTION TRAFFIC

The Contractor shall comply with all legal load restrictions as set forth in "Alaska Oversize and Overwidth Permit Manual", current edition, and current revisions to Title 17, Chapter 15, of the Alaska Administrative Code in the hauling of materials on public roads, beyond the limits of the project, and on all public roads within the project limits that are scheduled to remain in use upon completion of the project.

Any load restrictions applicable to roadway or structures within the project limits will be given in the Special Provisions.

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 noted elsewhere in the Contract. No loads will be permitted on a concrete pavement, base or structure before the expiration of the curing period. In no case shall legal limits be exceeded unless permitted in writing. The Contractor shall be responsible for all damage done by his/her equipment. The Contractor shall operate his/her equipment in a safe, considerate manner at all times. The Contractor shall strictly comply with all traffic control devices, laws, speed limits, specific routes, or other requirements of the Contract.

104—1.12 MAINTENANCE DURING CONSTRUCTION

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

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

104—1.13 USE OF COMPLETED PORTIONS

The Owner shall have the right to take possession of and use any completed or partially completed portions of the Work whether or not the time for completing the Work has expired. Such taking possession and use shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents. Further, the Owner shall have the right to use and collect revenues from any completed or partially completed portion of the Work prior to the time of completion of the project except where such use substantially and adversely influences the progress or cost of the Contractor's operations.

The Owner shall be responsible for any damages incurred as a direct result of his/her use of the portion of the Work except when such damages occurred as a result of uncompleted Work or faulty workmanship or materials. Prior to using any portion of the Work, the Owner shall file with the Contractor an account of the Work yet to be completed.

The Contractor shall not be responsible for damages incurred by a third party to that portion of the Work which the Owner is using provided that said damage is not a direct result of the Contractor's negligence or did not occur as a result of Work not completed by the Contractor. The Contractor shall not be entitled to any extra compensation for or extension of time due to such costs arising from the use of any portion of the building or facility by the Owner after the time of completing the Work has expired.

104—1.14 CLAIMS FOR ADJUSTMENTS AND DISPUTES

If the Contractor deems that extra compensation or an extension of time is, or will become, due him/her because of any condition, act, or occurrence in connection with the Work, he/she shall immediately provide written notice to the Engineer of his/her intention to make claim for such compensation or time extension before he/she begins the Work on which his/her claim will be based. If such notification is not given or the Engineer is not afforded proper facilities by the Contractor for keeping strict account of actual cost, then the Contractor hereby agrees to waive the claim for extra" compensation. Such notice by the Contractor and the fact that the Engineer has kept account of the cost as aforesaid, shall not in any way be construed as proving the validity of the claim.

If the matter cannot be resolved by agreement or change order within seven (7) days, the Contractor shall within the next fourteen (14) days, submit written notice of the facts which may form the basis of the claim. In addition, all claims by the Contractor for additional compensation or an extension of the time of performance or any dispute regarding a question of fact or interpretation of the Contract shall be presented in writing by the Contractor to the Engineer within the next thirty (30) days unless the Engineer agrees in writing to an extension of time for good cause shown. Good cause shown shall include time for the Contractor to prepare its claim and the Engineer shall grant an extension of not more then thirty (30) days for preparation of the claim. The Contractor agrees that unless these written notices are provided, the Contractor will have no entitlement to additional time or compensation for such act, event or condition. The Contractor shall in any case continue diligent performance of the Work.

It is the responsibility of the claimant to provide adequate justification for the claim and mitigate the damages incurred in connection with the claim. In presenting the claim, the Contractor shall specifically include, to the extent possible, the following:

1. The Contract provisions which apply to the claim and under which it is made;
2. The bid items and quantities, if any, upon which the claim amount is based;

3. The specific relief requested, including the additional compensation claimed and the basis upon which it was calculated or the additional time requested and the basis upon which it was calculated. All calculations and evidence for compensation claimed shall comply with the provisions of Section 108-1.05 - Compensation for Extra Work.

Claims for damages for unreasonable delay in the Work that is the result of any act or neglect caused by the Owner or his/her employee or by any other Contractor employed by the Owner, by changes ordered in the Work, or by a substantial change in site conditions, shall be limited to a reasonable time necessary for the Contractor to move that portion of his/her workers and equipment to another location which, in the opinion of the Engineer, is suitable for operations by those forces without undue hardship or damage to the Contractor. No claim for standby time will be allowed for time prior to the notification of the Engineer of the conditions or event that is the basis for the claim.

The claim will be acknowledged in writing by the Engineer. If the claim is not disposed of by meetings between Contractor, Engineer and Owner which result in agreement within ninety (90) days after the date of substantial completion or date of claim submission, whichever is later (provided additional time is not granted in writing by the Engineer) administrative remedies shall be considered to be exhausted.

Any dispute or claim arising out of or relating to this Contract, or the breach thereof which cannot be resolved by mutual agreement, shall be settled by arbitration in accordance with the rules of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator(s) may be entered in any court having jurisdiction thereof. Any dispute between the parties arising out of this agreement shall be determined in the judicial district of the state in which the Work is or was to be performed, and the prevailing party will be entitled to all costs whether or not arbitration is instituted, including without limitation, reasonable attorney's fees during arbitration on appeal, and in connection with enforcement of any judgment.

104—1.15 LANDS FOR WORK

The Owner shall provide as indicated on the drawings and not later than the date when needed by the Contractor the lands upon which the Work under this Contract is to be done, rights of way for same, and such other lands which are designated on the drawing for the use of the Contractor. Any delay in the furnishing of these lands by the Owner shall be deemed proper cause for an equitable adjustment in both the Contract price and time of completion.

The Contractor shall provide at his/her own expense and without liability to the Owner any additional land and access thereto that may be required for temporary construction facilities or for storage of materials. Site access, whether Owner's property, public right of way, or private property owned by others is not warranted as to its suitability or safety for Contractor's operations. The Contractor shall indemnify and hold the Owner, Engineer, and their officers and employees harmless from all damages incurred through or by the use of any roadway or other facility used as access to the construction site.

END OF SECTION

SECTION 105 CONTROL OF MATERIAL

105—1.01 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS

The materials used on the Work shall meet all requirements of the Contract. In order to expedite the inspection and testing of materials, the Contractor shall notify the Engineer of his/her proposed sources of materials at least thirty (30) days prior to shipment. All materials originating outside the State of Alaska may be inspected by an agency designated by the Owner. Inspectors are not authorized to approve materials. However, approval, subject to field inspection, may be given on the basis of inspection reports indicating full compliance with the specifications.

In order to establish standards of quality, the Engineer may have referred in the Contract to certain products by name and catalog number. Unless specifically stated otherwise, products of equal or better performance and quality may be substituted if, after review of product data submitted as described herein, the Engineer so approves in writing.

The Contractor shall furnish to the Engineer the complete list of proposed substitutions in sufficient time prior to their use to give the Engineer adequate time for his/her review, together with such engineering and catalog data as the Engineer may require. Failure on the part of the Contractor to supply data to the Engineer prior to ordering or using such alternate material or equipment will not relieve the Contractor of furnishing acceptable material or equipment as required by the Engineer. The Contractor shall provide a schedule for submission of shop drawings to the Engineer no later than ten (10) days prior to the start of the Work.

The Contractor shall abide by the Engineer's judgment when proposed substitute materials or items of equipment are judged to be unacceptable and shall furnish the specified material or item of equipment in such case. All proposals for substitutions shall be submitted in writing by the Contractor - not by individual trades or material suppliers. The Engineer will review proposed substitutions within a reasonable time after submission and no substitutions shall be used unless the substitution is accepted in writing.

Any review or acceptance of substitution by the Engineer does not relieve the Contractor from his/her obligation fully to perform all Contract requirements nor does it give rise to any right of action or suit by Contractor or third persons against Owner or Engineer.

The Contractor will provide, upon written request from the Engineer, a notarized certification that all materials meet or exceed the requirements specified in the contract documents.

Unless otherwise specifically provided for, all equipment, materials and articles incorporated in the Work covered by this Contract shall be new and of the specified grade. The Contractor shall furnish to the Engineer for his/her approval the name, address and phone number of the manufacturer and supplier of machinery, mechanical and other equipment which he/she contemplates incorporating in the Work, together with their performance capacities and other pertinent information. Machinery, equipment, materials and articles installed or used without approval shall be at the risk of subsequent rejection.

The Contractor shall furnish all materials required from sources of his/her choice unless specifically stated otherwise on the plans or in the Special Provisions.

The Engineer shall provide the Contractor with a submittal control form that will list the submittals required for the project, and a submittal form that will be provided with every submittal made.

105—1.02 MATERIALS AND EQUIPMENT FURNISHED BY OWNER

The Contractor shall furnish all materials required to complete the Work, except those specifically denoted to be furnished by the Owner.

Owner-furnished material and/or equipment, if any, will be provided to the Contractor at the location indicated and in the manner prescribed in the Special Provision section of these specifications. The Contractor shall load and transport all such equipment or materials to his/her storage or the construction site. The Contractor shall examine the materials and equipment immediately upon transfer from the Owner and advise the Owner of any defects. Failure of the Contractor to so examine or advise Owner of any defects will relieve Owner of any responsibility for defects. The Contractor shall be responsible for material or equipment loss or damage after receipt at the point of delivery.

105—1.03 SAMPLES, TESTS, ACCEPTANCE

All materials for which tests are specified will be inspected and tested by the Engineer before incorporation in the Work. Any Work in which untested and unaccepted materials are used without approval or written permission of the Engineer shall be performed at the Contractor's risk and may be considered as unacceptable and unauthorized and will not be paid for. Unless otherwise stated, tests in accordance with Alaska Test Methods, AASHTO, ASTM or other cited methods, shall conform to the edition current on the date of advertisement of bids. Any such tests shall be made by and: at the expense of the Owner except as otherwise stated. The cost of tests: that fail to meet specification requirements will be deducted from the Contract price. Samples will be taken by a qualified testing firm or representative of the Owner. Copies of all test results will be furnished to the Contractor's representative at his/her request.

The Owner reserves the right to retest all materials which have been tested at the source of supply after delivery to the work site and prior to incorporation in to the Work, and after incorporation into the Work, and to reject all materials which, when retested, do not meet the requirements of the specifications.

105—1.04 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:

1. The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.
2. The Engineer shall have full entry at all times to such parts of the plant as may concern the manufacture or production of the materials being furnished.
3. The Engineer shall be advised of the production and/or fabrication schedule a minimum of 48 hours prior to beginning Work on any item requiring inspection. All materials for which the Engineer has requested plant inspection and which are fabricated without such inspection shall be considered unacceptable. Any testing required to prove the acceptability of such materials shall be performed by the Contractor at Contractor's expense.

105—1.05 STORAGE OF MATERIALS AND EQUIPMENT

Materials shall be stored in such a manner as to insure the preservation of their quality and fitness for use. Suitable sheds, platforms and covers shall be provided when necessary to protect all materials. All materials shall be stored in such a manner as to facilitate inspection, including separate storage and labeling of materials to be incorporated in the Work.

Stored materials, even though approved before storage, may again be inspected prior to their use in the Work. The Contractor shall be totally responsible for the security of materials and equipment. Damage due to vandalism or environmental causes will not be considered a valid basis for a claim for time extension or extra compensation.

Private property shall not be used for storage purposes without written permission of the owner or lessee. If requested, copies of such written permission shall be furnished. All storage sites shall be restored to conditions specified in the use agreement by the Contractor at his/her expense.

105—1.06 DEFECTIVE MATERIALS OR EQUIPMENT

All materials or equipment not conforming to the requirements of the Contract shall be considered defective. Upon failure on the part of the Contractor to remove, repair, or replace defective material when so ordered by the Engineer, the Owner shall have authority to remove, repair or replace such defective material and to deduct all costs so incurred from any monies due or to become due to the Contractor. Defective material not permitted for use shall be immediately removed from the site or disposed of as directed by the Engineer.

105—1.07 MANUFACTURERS' DIRECTIONS

Manufactured articles, material and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer. The Contractor shall immediately notify the Engineer of any conflict between manufacturer's directions and specification instructions. The Engineer will then issue instructions for proceeding. In general, however, the more stringent provisions will take precedence.

END OF SECTION

SECTION 106 LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

106—1.01 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. He/She shall at all times observe and comply with all such laws, ordinances, regulations, orders and decrees. He shall protect and indemnify the Owner and his/her representatives against claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself/herself or his/ her employee.

106—1.02 PERMITS, LICENSES AND TAXES

Except as otherwise provided, 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. As a condition of performance of this Contract, the Contractor shall pay all Federal, State and local taxes incurred by the Contractor in the performance of this Contract. Proof of payment of these taxes is a condition precedent to final payment by the Owner under this Contract.

106—1.03 PATENTED DEVICES, MATERIALS AND PROCESSES

If the Contractor employs any design, device, material, or process covered by letters of patent, trademark or copyright, he/she 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 Owner and any affected third party from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of any infringement, at any time during the prosecution or after the completion of the Work.

106—1.04 HIRING ALASKA LABOR

It shall be understood between the parties that this Contract is governed by all the provisions of Title 36, Chapter 10, of the Alaska Statute.

106—1.05 MINIMUM RATES OF PAY

In accordance with Alaska Statutes AS 36.05.010 and AS 36.06.070 the Contractor shall pay not less than the current prevailing rate of wages for Work of a similar nature in the region in which the Work is done. The current prevailing rate of wages for each pay period is that contained in the latest determination of prevailing rate of wages issued by the Alaska Department of Labor before the end of the pay period. The Contractor and all subcontractors shall pay all employees unconditionally and not less than once a week.

The prevailing wage rates current at the time of bid advertisement are included as part of the Supplementary Conditions. However, the Contractor shall adjust the wage rates paid for each pay period to equal or exceed the prevailing rate of wages in effect at the end of that pay period. The Contractor shall post the scale of wages to be paid in a prominent and easily accessible place at the work site.

AS 36.05.035 requires the Owner to notify the Department of Labor of the Contractor and all subcontractors who perform work under this Contract. The Owner will notify the successful Contractor that it has been awarded the Construction Contract, and send a copy of the Notice of Award to the Department of Labor. The Contractor, within seven (7) calendar days of receiving the Notice of Award and before any subcontractors perform work on this project, will notify the Department of Labor of all subcontractors it plans to use on this Project, and send a copy of the notice to the City Engineer. The Contractor will immediately notify the Department of Labor of any change or addition of subcontractors and send a copy of the notice to the City Engineer.

All Contractors and their subcontractors, regardless of tier, shall prepare and submit weekly certified payrolls for all employees doing Work on the Project to the Alaska Department of Labor and the Engineer within seven (7) calendar days following the last working day of the week for which the payroll report is prepared. Subcontractors shall forward their certified payrolls through the Contractor.

106—1.06 PROTECTION OF WORK AND WORKERS

The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours.

The Contractor shall comply with all applicable provisions of Federal, State and Municipal safety laws and building and construction codes. The Contractor shall also comply with the recommendations in the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America insofar as applicable unless such instructions are incompatible with Federal, State or Municipal laws or regulations. Monthly reports of all lost time accidents shall be promptly submitted to the Engineer, and shall give data as requested by the Engineer. Failure to comply with provisions of this paragraph shall constitute sufficient cause for the Engineer to suspend all Work.

The Contractor shall provide such safeguards and protections around and in the vicinity of excavations as may be necessary to prevent and avoid the occurrence of damage, loss, injury and death to property and persons because of such excavations. Liability for any such damage, loss, injury or death shall rest with the Contractor.

Until final acceptance of the Project by the Engineer, the Contractor shall have the charge and care of the Work and shall take every precaution against injury, loss, or damage to any part thereof whether installed in the Work or in storage by the action of the elements or from any other cause, whether arising from the execution or from the non-execution 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 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 shall erect any necessary temporary structures, signs, or other facilities at his/her 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 his/her Contract.

106—1.07 PROTECTION OF PUBLIC AND PROPERTY

The Contractor shall provide and maintain all necessary personnel to watch barricades, warning lights and warning signs and take all necessary precautions for the protection of the public. All signs and warning devices shall be as specified in the "Manual of Uniform Traffic Control Devices" and placed as directed by the Engineer. No Work may proceed until the Contractor has provided evidence satisfactory to the Engineer that the required warning devices have been obtained.

The Contractor shall be responsible for all damage or injury to property of any character resulting from any act. Omission, neglect, or misconduct in his/her manner or method of executing the Work, or at any time due to defective Work or materials, during the prosecution of the Work, and said responsibility will not be released until the Project shall have been completed and accepted. The Contractor shall provide all scheduling, temporary fencing, etc. necessary to maintain the security of private property affected by the Work.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, Omission, neglect, trespass, or misconduct in the execution of the Work, or in consequence of the non-execution thereof by the Contractor, he/she shall restore, at his/her own expense, such property to condition similar or equal to that existing before such damage or injury.

To protect property adjacent to the Work the Contractor shall not use compaction methods or equipment that will damage adjacent structures or their contents or use explosives.

Unless and until the Engineer directs otherwise the Contractor shall carefully preserve bench marks, other survey monuments, reference points and stakes, and in case of willful or careless destruction, he/she shall be charged with the resulting expense and shall be responsible for any errors that may be caused by their unnecessary loss or disturbance.

In an emergency affecting the safety of life or of the Work or of adjoining property the Contractor, without special instruction or authorization from the Engineer or Owner, is hereby permitted to act, at his/her discretion, to prevent such threatened loss or injury and he/she shall so act without appeal if so instructed or authorized. Any compensation claimed by Contractor on account of emergency Work shall be determined by negotiation or as a claim for extra compensation.

At least seven (7) days prior to commencing Work on the project, the Contractor shall notify each property owner or tenant within or adjacent to the project area about the project giving the project name, expected start and finish dates, expected hazards, such as street closures, excavation, utility interruptions, vibration, and the name and address of the Contractor. This notification shall consist of door knob notices, personal visits with written receipt of information, or other method approved in advance by the Engineer.

106—1.08 RESPONSIBILITY FOR DAMAGES

The Contractor shall indemnify and save harmless the Owner, the Engineer, the Consulting Engineer, its officers, employees and agents, 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 or in consequence of any neglect in safeguarding the work; or through the use of unacceptable materials in constructing the work; or because of any act of omission, neglect, or misconduct of said Contractor; or from any claims or amounts arising or recovered under "Workers Compensation Act", or any other law, order, or decree; and so much of the

money due the said Contractor under and by virtue of his/her contract as may be considered necessary by the Owner for such purpose may be retained for the use of the Owner; or, in case no money is due, his/her 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 Owner; except that money due the contractor will not be withheld when the Contractor produces satisfactory evidence that he/she is adequately protected by public liability and property damage insurance.

It is specifically agreed between the parties executing this contract that it is not intended by any of the provisions of any part of the contract to create the public or any member thereof, other than the Owner, the Engineer, its officers, employees and agents, as a third party beneficiary hereunder, or to authorize anyone not a party to this contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of this contract.

106—1.09 INSURANCE

The Contractor shall take out and maintain throughout the construction period insurance in the following minimum requirements:

A. Worker's Compensation insurance covering all employees in statutory limits who perform any of the obligations assumed by the Contractor under the Contract.

B. Comprehensive General Liability insurance including Broad Form Property Damage, Products and Completed Operations, and Contractual Liability for limits not less than:

Five Hundred Thousand dollars (\$500,000) each occurrence for bodily injury sustained by one or more persons as the result of anyone occurrence,

One Million dollars (\$1,000,000) aggregate for bodily injury sustained during the policy year,

and

Five Hundred Thousand dollars (\$500,000) each occurrence for property damage,

One Million dollars (\$1,000,000) aggregate for property damage during the policy year.

C. Comprehensive Automobile Liability insurance including coverage for non-owned, and hired vehicles for limits not less than:

Five Hundred Thousand Dollars (\$500,000) each accident for bodily injury sustained by one person,

One Million dollars (\$1,000,000) each accident for bodily injury sustained by two or more persons,

and

Five Hundred Thousand dollars (\$500,000) each accident for property damage,

or

One Million dollars (\$1,000,000) each accident combined single limit.

D. BUILDER'S RISK "ALL RISK" INSURANCE:

Before commencement of the Work, the Contractor shall submit written evidence that he/she has obtained for the period of this Contract, Builder's Risk "All Risk" Completed Value insurance coverage (including earthquake, but excluding flood and landslide unless specified elsewhere in the specifications for this project) upon the entire Project which is the subject of this Contract and including completed Work and Work in progress. Such insurance may have a deductible clause, but not to exceed five thousand dollars (\$5,000). Owner and Contractor waive all rights against each other and their officers, agents, and employees, including Engineer, for damages caused to the Work to the extent insured hereunder.

The Comprehensive General Liability, Comprehensive Automobile Liability and Builder's Risk "All Risk" insurance shall include as additional insureds: the Owner(s), the Engineer, the Consulting Engineer, each of their officers, agents and employees; and any other persons with an insurable interest designated by the Owner as additional insured. The policies must provide that each additional insured will be treated as if separate notices had been issued.

Special hazards coverage such as, but not limited to, property damage as a result of Explosion hazard, Collapse hazard, Underground Property damage hazard, commonly known as XCU, shall be included or added by endorsement to the Comprehensive General Liability coverage for all construction contracts.

It shall be the responsibility of the Contractor to determine that all subcontractors meet all the foregoing insurance requirements before commencing any work at the site.

The Owner shall have the right at any time to require higher limits for public liability and property damage insurance than those required in subsection "B" and "C" of this section. In any such event, the additional premium or premiums payable solely as the result of such additional insurance shall be added to the Contract price.

The Contractor shall furnish the Owner with Certificates of Insurance to certify insurance coverage before commencing any work at the site. All such certificates shall state that the insurance policies referred to therein include a provision that while this Contract shall remain in force no such policy shall be cancelled or materially altered until at least thirty (30) days written notice thereof has been given to the Owner. A sample Certificate of Insurance is included with the bid documents.

106—1.10 PERSONAL LIABILITY OF OWNER'S REPRESENTATIVES

In carrying out any of the provisions of these specifications, or in exercising any power or authority granted to them by or within the scope of the Contract, there shall be no liability upon the Engineer, the Consulting Engineer, his/her authorized representatives, or other representatives of the Owner, either personally or as officials of the Owner, it being understood that in all such matters they act solely as agents and ~ representatives of the Owner.

106—1.11 NO WAIVER OF LEGAL RIGHTS

The Owner shall not be precluded or estopped by any measurement, estimate, or certificate made either before or after the completion and acceptance of the Work and payment therefore, from showing the true amount and character of the Work performed and materials furnished by the Contractor, nor from showing that any measurement, estimate or certificate is untrue or incorrectly made, nor that the Work or materials do not in fact conform to the Contract. The

Owner shall not be precluded or estopped, notwithstanding any such measurement estimate, or certificate and payment in accordance therewith, from recovering from the Contractor or his/her sureties or both, such damages as it may sustain by reason of his/her failure to comply with the terms of the Contract. Neither the acceptance by the Owner, or any representative of the Owner, 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 Owner, shall operate as a waiver of any portion of the Contract or of any power herein reserved, or of any right to damages. A waiver of any breach of the Contract shall not be held to be a waiver of any other subsequent breach.

106—1.12 PERSONAL INTEREST OF OWNER'S OFFICIALS

No official of the Owner who is authorized on behalf of the Owner to negotiate, make, accept, or approve or to take part in negotiating, making, accepting, or approving any consulting, inspection, construction or material supply Contract in connection with the construction of the Project shall become personally interested, either directly or indirectly, in this Contract or in any part thereof. No officer, employee, attorney, engineer, or inspector for or of the Owner who is authorized in such a capacity on behalf of the Owner to exercise any executive, supervisory or other similar functions in connection with the construction of the Project shall become personally interested, either directly or indirectly, in this Contract or in any part hereof or in any material supply Contract, subcontract, insurance Contract, or in any other Contract relating to the performance of this Contract.

106—1.13 INTEREST OF MEMBER OF OR DELEGATE TO CONGRESS, CITY OFFICIAL OR CITY EMPLOYEE

No member or delegate to Congress, resident commissioner, city official or city employee shall be admitted to any share of part of the Contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

106—1.14 SAVINGS

To the best knowledge and belief of the parties, the Contract contains no provision that is contrary to any law or to any ruling or regulation of a federal or state agency. Should any provision of the Contract at any time be in conflict with any such law, ruling or regulation, then such provision shall continue in effect only to the extent that it remains valid. In the event any provision of the Contract becomes thus inoperative, the remaining provisions of the Contract shall nevertheless remain in full force and effect.

END OF SECTION

SECTION 107 PROSECUTION AND PROGRESS

107—1.01 SUBLETTING OF CONTRACT

The Contractor shall not assign the Contract or sublet it without the written consent of the Engineer nor shall the Contractor assign any monies hereunder without the previous consent of the Engineer. Assigning or subletting the Contract shall not relieve the Contractor or his/her surety from any Contract obligation.

The Contractor shall perform with his/her own organization not less than fifty percent (50%) of the Contract price. No additions to the Contract price as a result of extra or additional Work as authorized by the Engineer shall be considered in computing the minimum percentage of the Contract which must be performed directly by the Contractor. No portion of the Contract shall be sublet except with the written consent of the Engineer. Requests for permission to sublet any portion of the Contract shall be in writing and accompanied by a statement of qualification showing that the organization that will perform the Work is particularly experienced and equipped for such Work. Written consent to sublet any portion of the Contract shall not be construed to relieve the Contractor of any of his/her responsibilities under the Contract. Within seven (7) days after the Notice of Award, the Contractor shall notify the Engineer in writing of the names of the subcontractors proposed for the Work and shall not employ any that the Engineer, within a reasonable time, may object to as incompetent or unfit.

All subcontracts shall be in writing and shall provide that all Work to be performed thereunder shall be conducted and performed in accordance with the terms of the prime Contract. Upon request, certified copies of any or all subcontracts shall be furnished to the Engineer.

The Contractor agrees that he/she is fully responsible to Owner for the acts and omissions of his/her subcontractors and of persons either directly or indirectly employed by them as he/she is for the acts and omissions of his/her own employees.

Nothing contained in the Contract shall create any contractual relation between any subcontractor and the Owner. Insofar as it is practicable, the Contractor shall make payment for subcontract Work in the same units and on the same basis of measurement as apply under the prime Contract. The Owner will not be responsible for loss resulting from Contractor's failure to do so. In making payments to subcontractor, Contractor shall protect himself/herself against possibility of overpayment, and he/she shall assume such losses as may result from overpayment.

The subcontracting of any or all of the Work to be done will in no way relieve Contractor of any part of his/her responsibility under the Contract. The Contractor shall have on the Work at all times a qualified and capable superintendent whose duty shall be to direct and coordinate the operations of the subcontractors and to make certain orders of the Engineer are complied with. Failure of Contractor to control the Work of the subcontractors, or failure of the subcontractors to perform the Work to the satisfaction of Engineer will result in the issuance of orders requiring the cancellation of the subcontracts and removal of the subcontractors from the Work.

107—1.02 PROGRESS SCHEDULE

Within fifteen (15) days after receipt of the Notice of Award the Contractor shall prepare and submit a progress schedule to the Engineer. That schedule shall show the durations and interrelationships of each component part (event) of the Work. The events of the Work utilized shall each be the smallest reasonable portions of the Work that are unique and describable. These events or activities shall include administrative, ordering, delivery, mobilizations, installation and demobilization durations. The schedule must reflect required Project phasing and state the working

hours the Contractor's Work force will be working. The preferred scheduling method is the Critical Path Method (CPM).

Event durations, interrelationships, and other components of the schedule must be reasonable and acceptable to the Engineer.

The Contractor shall update and resubmit the progress schedule along with each partial payment request, but no less frequently than once each month. Receipt of this required progress schedule properly updated will be a condition for payment of the partial payment request.

Receipt and acceptance of a schedule submitted by the Contractor shall not be construed to assign responsibility for performance or contingencies to the Owner or relieve the Contractor of his/her responsibility to adjust his/her forces, equipment, and Work schedules as may be necessary to insure completion of the Work within the prescribed Contract time limit(s).

107—1.03 NOTICE TO PROCEED

A written notice to proceed will be submitted to the Contractor fixing the date from which Contract time will be charged and directing the commencement of Work under the Contract. No construction Work on site will be allowed until the notice to proceed is issued.

107—1.04 PROSECUTION OF THE WORK

Adequate material, equipment and labor shall be provided by the Contractor to carry out work in accordance with the Contract and the progress schedule submitted by him/her and to complete the Contract within the time specified. The Work shall be performed as vigorously and continuously as weather conditions will permit and in accordance with a schedule which will insure completion within the specified time limit, due allowances being made for possible unfavorable conditions, interference, breakdowns, and other causes of delay. It is inevitable that changes to the Work will become necessary due to utility conflicts, dimensional variations or other unforeseen conditions. In planning the construction Work, the Contractor shall allow adequate time to accommodate the minor delays due to the investigation and preparation of instructions to the Contractor in connection with the necessary changes to the Work.

Should the prosecution of the Work be discontinued or working hours changed for any reason, the Contractor shall notify the Engineer in writing at least twenty—four (24) hours in advance of resuming operations (in the case of Work suspension) or the altered schedule (in the case of a change in working hours).

Operations on the various units or portions of the Work shall begin at the times and locations approved by the Engineer and shall be prosecuted between such limits as he/she may establish. No part of the Work shall be undertaken without his/her approval, and no Work shall be carried on contrary to his/her instructions.

The Contractor shall not open up Work to the prejudice or detriment of Work already started. The Engineer may require the Contractor to finish a section on which Work is in progress before Work is started on any additional section if the opening of such section is essential to public convenience. The Contractor shall not be allowed to stop or otherwise impede traffic outside of the Project limits without written permission.

If the Contractor should neglect to prosecute the Work properly or fail to perform any provision of the Contract, the Owner after three (3) days' written notice to Contractor may without prejudice to

any other remedy, make good such deficiencies and deduct the cost thereof from the payment then or thereafter due Contractor.

107—1.05 CHARACTER OF WORKERS, METHODS AND EQUIPMENT

The Contractor shall employ only workers with sufficient skill and experience to perform properly the Work assigned to them. Workers engaged in special Work, or skilled Work, shall have sufficient experience in such Work and in the operation of the equipment required to perform all Work properly and satisfactorily.

It is the responsibility of the Contractor to enforce order and cooperation among its employees and to enforce order and cooperation of its employees with the Engineer.

Should the Contractor fail to enforce order and cooperation, or fail to furnish suitable, sufficient personnel and equipment for the proper prosecution of the Work, the Engineer may suspend the Work by written notice until such orders are complied with.

During the performance of this Contract, the Contractor agrees not to employ on such Project any alien in the United States in violation of the Immigration and Nationality Act or any other law, convention, or treaty of the United States relating to the immigration, exclusion, deportation, or expulsion of aliens.

No convict labor shall be employed and no materials manufactured or produced by convict labor shall be used in connection with the Work. This provision shall not be construed as applying to convicts on parole or probation.

The Contractor shall not discriminate against any person because of sex, race, creed, color, or national origin.

The Contractor shall include the provisions of the preceding paragraphs in every subcontract so that such provisions will be binding upon each subcontractor.

All equipment which is proposed for use on the Work shall be of appropriate size and in such mechanical condition as to meet the requirements of the Contract and to produce a satisfactory quality of Work.

When the methods and equipment to be used by the Contractor in accomplishing the construction are not prescribed in the Contract, the Contractor is free to use any methods or equipment that he/she demonstrates to the satisfaction of the Engineer will accomplish the Contract Work in conformity with the requirements of the Contract, except as provided above.

When the Contract specifies that the construction be performed by the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized.

107—1.06 TIME OF COMPLETION OF WORK AND TIME EXTENSIONS

Time is of the essence of the Contract. The Work to be done under the Contract shall be completed in its entirety within the time specified in the Contract Documents.

The date of commencement will be the date established in the Notice to Proceed. If there is no Notice to Proceed, it shall be the date of the agreement signed by the Owner and the Contractor.

The Engineer may at his/her discretion recommend that the Owner extend the time for completion of the Work without invalidating any of the provisions of the Contract and without releasing the surety. Extensions of time, when recommended by Engineer, will be based upon the effect of delays to the Project as a whole and will not be recommended for non-controlling delays to minor included portions of the work unless it can be shown that such delays did, in fact, delay the progress of the Project as a whole.

Acts of God, inclement weather, governmental regulations, labor disputes, strikes, fires, required extra work or any delay totally beyond the control of the Contractor may justify an extension of time.

No extension of time for completion will be allowed for delays or suspensions caused by or contributed to by the fault or negligence of Contractor or his/her subcontractors.

All time extensions requested by Contractor shall be made to Engineer in writing on or before the tenth day following the day in which the alleged delay is said to have occurred and any claim for extension of time shall state explicitly the reasons therefore or and the number of days claimed. Should Contractor fail to file such written claim for extension of time within the period provided he/she shall have abandoned any claim therefore.

Unless otherwise provided herein, Contractor's sole remedy for any justified delay in the Work will be an extension of time and he/she will be entitled to no delay damages, wage escalation, material escalation, extended overhead, or additional compensation of any kind except for such delays as maybe caused solely by any default of Owner of this agreement.

The Engineer by written order may suspend Work on the Project, in whole or in part, for such periods as he/she may judge necessary due to inclement weather, unforeseen emergency conditions, or to expedite public traffic. When the Work is suspended for one or more calendar days by order of the Engineer, the time for completion will be increased, except as hereinafter stated.

In those instances where the Engineer orders suspension of the Work for failure by the Contractor to carry out contractual provisions, or for failure to carry out orders given by the Engineer within the limits of the Contract, the Contractor will not be entitled to an increase in the time for completion.

107—1.07 FAILURE TO COMPLETE ON TIME

In naming the prices for completion of the Work within the time specified, it shall be understood and agreed that the Work, together with all required testing and inspection, shall be completed within that time. If, however, said Work, testing and inspection is not completed within the time named in the Contract, together with any extensions, the Owner may deduct and retain out of any sum then due or that may become due the Contractor at time of such delinquency or later the sum specified in the Contract for each and every calendar day that the day of substantial completion is delayed. In submitting a proposal and signing the Contract, Contractor thereby shall have agreed to these provisions and, furthermore, that the sum deducted and retained is not a penalty but a reimbursement to Owner for damages which Owner will have sustained by reason of such delayed completion. Damages so liquidated are understood to include the additional cost to Owner for engineering supervision, interest charges, overhead, and other costs, all for which damages would be difficult or impossible to ascertain accurately.

Amounts due Owner and Contractor under the foregoing provisions shall be deducted from any monies then due or to become due said Contractor under the Contract, and such deductions shall not release Contractor from his/her obligation to fulfill the entire Contract.

107—1.08 OWNER'S RIGHT TO TERMINATE CONTRACT

If the Contractor should be adjudged a bankrupt or if he/she should make a general assignment for the benefit of his/her creditors or if a receiver should be appointed on account of his/her insolvency or if he/she should persistently or repeatedly refuse or should fail to supply enough properly skilled workers or proper materials for the efficient prosecution of the Project or if he/she should fail to make prompt payment to subcontractors or for material or persistently disregard the laws, ordinances, or the instructions of the Engineer, or otherwise fail to comply with any provision of the Contract, then the Owner, upon the certificate of the Engineer that, in his/her opinion, sufficient cause exists to justify such action, may without prejudice to any other right or remedy and after giving the Contractor and his/her surety seven (7) days' written notice, terminate the Contract and take possession of the premises, or any part thereof, and of all materials, tools, equipment, machinery, and appliances thereon and finish the Work, or any part thereof, by whatever method it may deem expedient.

Neither by the taking over of all or any portion of the Work nor by its completion in accordance with the terms of this provision shall the Owner forfeit its right to recover damages from Contractor or from Contractor's surety for failure to complete or for delay in such completion. Should the expense incurred by Owner in taking over and completing any and all of the Work, including without limitation any additional administrative or engineering expense, be less than the sum that would have become payable under this agreement if the Work had been completed by Contractor, then Contractor shall be entitled to the difference with no interest, and should such expense exceed the said sum, then Contractor and Contractor's surety shall be liable to Owner for the amount of such excess. Upon the taking over of the Work by Owner as herein provided for, no further payment will be made to Contractor until the Work is completed, and any monies due or that may become due Contractor under this agreement may be withheld and applied by Owner to payments for labor, materials, supplies, and equipment used in the prosecution of the Work, and/or for the payment or rental charges on equipment used therein, or to the payment of any excess cost to Owner incurred in completing the Work. The election by Owner to take over any of the Work shall not constitute Owner's sole remedy, but rather Owner reserves all other remedies at law or in equity upon default or breach of Contract.

The Contractor and its surety shall likewise be liable for any expenses incurred by the Owner in completing the Contract.

107—1.09 CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the Work should be stopped under an order of any court or other public authority for a period of three (3) months through no fault of the Contractor or of anyone employed by him/her or if the Owner should fail to pay the Contractor within sixty (60) days of its maturity and presentation any sum certified by the Engineer or awarded by arbitrators, then the Contractor may, upon seven (7) days written notice to the Owner and the Engineer, stop Work or terminate this Contract and recover from the Owner payment for all Work executed plus any loss sustained upon any plant or materials plus reasonable profit and damage.

107—1.10 REMOVAL OF EQUIPMENT

In the case of termination of this Contract before completion for any cause whatever, the Contractor, if notified to do so by the Owner, shall, within thirty (30) days, remove any part or all

of his/her equipment or supplies form the property of the Owner. If he/she fails to do so, the Owner shall have the right to remove such equipment at the expense of the Contractor.

107—1.11 CORRESPONDENCE

All correspondence between the Owner and the Contractor will be consecutively numbered.

END OF SECTION

SECTION 108 MEASUREMENT AND PAYMENT

108—1.01 GENERAL

Whenever it is provided in plans and specifications that Work is “incidental” or that Work is clearly required, but not specifically included in any Contract Pay Item, it shall be understood that the Contractor’s compensation for such Work is to be included in other items of Work.

108—1.02 MEASUREMENT OF QUANTITIES

All Work completed under the Contract will be measured according to the United States standard measure.

A station when used as a definition or term of measurement will be one hundred linear feet.

Unless otherwise specified, measurement for area computations will be made horizontally, and no deductions will be made for individual fixtures having an area of nine square feet or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing.

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, will be measured parallel to the ground surface upon which such structures are placed, unless otherwise specified.

In computing volumes of excavation by the average end area method, the distance between end areas will be measured along the centerline of the roadway.

The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pile, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fractions of inches.

The term “ton” will mean the short ton consisting of 2,000 pound avoirdupois. If material is shipped by rail the car weight may be accepted, provided that only the actual weight of material be paid for.

Car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as directed, and each truck shall bear a plainly legible identification mark.

Material to be measured by volume in the hauling vehicle shall be measured therein at the point of delivery. Vehicles for this purpose may be of any acceptable size or type 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 directed. When legal loads are applicable, the approved volume measurement shall not exceed the legal capacity of the vehicle.

Lump sum items and items designated as “Contract quantity” will not be measured except to determine compensation for changes to the Work in connection with those items.

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

108—1.03 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.

If the “Basis of Payment” clause in the specifications relating to any unit price in the bid schedule requires that the said unit price cover and be considered compensation for certain Work or material essential to the contract pay item this same Work or material will not also be measured or paid for under any other pay item which may appear elsewhere in the specifications.

The term “lump sum”, when used as a basis for payment, shall mean full payment for the Work described in the Contract, including all necessary fittings and accessories.

If changes or additions in the Work are ordered which will vary the quantity of Work to be paid under a lump sum pay item, the lump sum payment will be increased or decreased in amount determined by multiplying the changed quantity of Work by the Contract lump sum price divided by the estimate quantity of Work described in the Contract for that pay item.

108—1.04 COMPENSATION FOR ALTERED QUANTITIES

Payment to the Contractor shall be made only for the actual quantities of Work performed measured and accepted or materials furnished, in conformance with the Contract. When the accepted quantities of Work or materials vary from the quantities stated in the bid schedule, the Contractor shall accept as payment in full, payment at the original Contract unit prices for the accepted quantities of Work and materials furnished, completed and accepted; except as provided below:

Where the final quantity of a major pay item varies more than twenty-five (25) percent above or below the bid quantity, either party to the Contract may request an equitable adjustment in the contract unit price of that item. Such adjustments shall be made by Change Order.

When the final quantity of work is greater than one hundred twenty-five (125) percent of the bid quantity, the equitable adjustment shall be made only for those units which are in excess of one hundred twenty—five (125) percent of the bid quantity.

When the final quantity of work is less than seventy-five (75) percent of the bid quantity, the equitable adjustment shall be made for those units of work done and accepted, except that the total payment for the item shall not exceed seventy-five (75) percent of the total amount bid for the item.

108—1.05 COMPENSATION FOR EXTRA WORK

Compensation for extra Work ordered or approved by the Engineer shall be determined by one or more or a combination of the following methods listed in order of precedence:

1. Unit bid prices for applicable Contract pay items.
2. A negotiated agreed lump sum.
3. Time and Materials Work.

108—1.06 COMPENSATION FOR TIME AND MATERIALS WORK

In the absence of applicable unit bid prices or agreement on a lump sum price for altered or extra Work the Contractor shall be compensated for that Work on a time and materials basis. That compensation shall be determined as follows:

1. Labor. For all labor and superintendents In direct charge of the specific operations, the Contractor shall be paid at the rates Indicated on the certified payroll, but at rates not to exceed those for comparable labor currently employed on the project. Payment will also include fringe benefits (Health and Welfare, Pension Fund, etc., when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed on the project).

Worker's Compensation Insurance (supported by proof of rates), and a labor markup (to cover additional bond, property damage liability insurance, unemployment insurance contributions, social security and other taxes, administrative overhead costs and profit). Compensation will be computed by the Engineer as follows:

- a. The total hours worked times the straight time rate of pay
 - b. plus the overtime hours worked times the difference between the overtime rate and the straight time rate
 - c. plus the fringe benefit rate times the total hours worked
 - d. plus the Worker's Compensation rate times a (above)
 - e. plus thirty (30) percent of the sum of a, c and d.
2. Materials. The Contractor shall furnish to the Engineer invoices for all materials used in the Work plus freight charges when applicable. If materials used on the time and materials work are taken from the Contractor's stock, then the Contractor shall furnish to the Engineer a certified statement showing the actual direct cost to the Contractor of said materials and the quantities used in the Work.
 3. Equipment. For any machinery or special equipment (other than small tools) which has been authorized by the Engineer, the Contractor shall receive the rental rates in the current edition of the "Rental Rate Blue Book for Construction Equipment", or the "Rental Rate Blue Book For Older Construction Equipment", published by Dataquest, Inc. Hourly rental rates shall be determined as follows:

The established rental rate shall be equal to the monthly rate for the basic equipment plus the monthly rate for applicable attachments, both divided by 176, plus the estimated hourly operating costs, all multiplied by the area adjustment factor.

The area adjustment factors shall be applied for those sections of the "Blue Book" containing an area adjustment map. The appropriate factor shall be determined by the Engineer.

The "Equipment Life" adjustment factor sections shall not apply. Attachments shall not be divided unless required for the directed Work.

For equipment not listed in this schedule, the Contractor shall receive a rental rate as agreed upon before such Work is begun. If agreement cannot be reached, the Engineer reserves the right to establish a rate based on similar equipment in the schedule or prevailing commercial rates in the area.

These rates shall apply for equipment used during the Contractor's regular shift of ten (10) hours per day. Where the equipment is used more than ten (10) hours per day, either on the Contractor's normal Work or on time and materials Work, an overtime rate, computed as follows, shall apply:

The overtime rate shall be equal to the monthly rate for the basic equipment plus the monthly rate for applicable attachments, both divided by 352, plus the estimated hourly operating costs, all multiplied by the area adjustment factor.

Equipment which must be rented or leased specifically for Work required under this section shall be authorized in writing by the Engineer. The Contractor shall be paid invoice price plus fifteen (15) percent.

When it is necessary to obtain equipment from sources beyond the Project limits exclusively for time and materials Work, the actual cost of transferring the equipment to the site of the Work and return will be allowed as an additional item of expense. Where the move is made by common carrier, the move-in allowance will be limited to the amount of the freight bill or, if the Contractor performs the move with his/her own forces, the rental rate for the hauling unit plus operator wages. In the event that the equipment is transferred under its own power, the moving allowance will be limited to one-half of the normal hourly rental rate plus operator's wages. In the event that the move-out is to a different location, payment will in no instance exceed the amount of the move-in. Move-in allowance shall not be made for equipment brought to the Project for time and materials Work which is subsequently retained on the Project and utilized for completion of Contract items, camp maintenance, or related Work.

Equipment ordered to be on a stand-by basis shall be paid for at the stand-by rental rate for the number of hours in the Contractor's normal Work shift, but not to exceed eight (8) hours per day. The stand-by rental rate shall be computed as follows:

The stand-by rate shall be equal to the monthly rate for the basic equipment plus the monthly rate for applicable attachments, both divided by 352, all multiplied by the area adjustment factor.

Time will be recorded to the nearest one-quarter hour for purposes of computing compensation to the Contractor for equipment utilized under these rates.

The equipment rates as determined above shall be full compensation, including overhead and profit for providing the required equipment and no additional compensation will be made for other costs such as, but not limited to, fuels, lubricants, replacement parts or maintenance costs. Cost of repairs, both major and minor, as well as charges for mechanic's time utilized in servicing equipment to ready it for use prior to moving to the Project and similar charges will not be allowed.

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

5. Work by a subcontractor. The Contractor shall be entitled to receive a mark—up on the total time and materials Work defined in 1. through 4. above performed by an approved subcontractor. This mark-up will be based on the following table and will be for administrative expenses incurred in connection with the Work. No percentage will be paid on Work covered under bid items in the original Contract. No percentage over the amount covered above will be paid if the Work is done by a sub-subcontractor.

To	\$1,000		10%
Over	\$1,000	to	\$100 plus 5% of
	\$10,000		excess over \$1,000
Over	\$10,000		\$550 plus 3% of excess
			over \$10,000

6. Work by a specialty Contractor. When the Engineer and the Contractor agree that a certain item or service cannot be satisfactorily performed by the forces of the Contractor or his/her subcontractors, such item or service may be performed by a specialist. Invoices for such item or service which are based on the current market price thereof may be accepted without complete itemization of labor, material and equipment costs when such itemization is impracticable or not customary under the circumstances. The Contractor will be paid the invoice cost of the service plus fifteen (15) percent.
7. Records. The Contractor will maintain a daily record of labor, equipment and materials utilized in the work and will present this record to the Engineer for verification at the end of each day's work. The Engineer or his/her representative shall check the daily records and sign them if he/she finds them correct.
8. Statements. Statements for time and material Work must show in payroll form the dates, names, hours worked each day, rates of pay, and amounts paid to each individual employed on such Work and must give in detail the nature of the Work done by each. Bills for materials must be fully itemized showing dates of delivery, quantities, unit prices, amounts, and discounts and must be accompanied by receipted invoices covering every item.

All bills, payrolls, and other forms of statements for payment on time and material Work must be submitted in triplicate, must state the identification number of time and material Work or applicable change order and the name or number of the Contract under which the Work was performed and must be approved by the Engineer. Failure to present statements in proper form within thirty (30) days after the close of the month in which the Work covered was performed, shall constitute a waiver on the part of the Contractor of his/her right to present such claim thereafter or to receive payment thereof.

9. Compensation. Payment for authorized time and materials Work will be made in the progress estimate following receipt of the verified daily records and any required supporting information from the Contractor. If, at any time, a basis of compensation can be agreed to for work under this subsection, such compensation may be set forth in writing in a change order.

108—1.07 PARTIAL PAYMENTS

Payment shall be made for Work and labor performed and materials incorporated in the Work or on hand under the Contract as follows:

The City shall initiate procedures to pay the Contractor under a public construction or public Work Contract within fifteen (15) days after the Contractor submits to the City a bill for

materials provided or services performed and a sworn statement that all employees employed on the Project by the Contractor and all subcontractors have been paid not less than the established prevailing rate of pay as determined and published by the State of Alaska, Department of Labor.

Partial payments under the Contract shall be made at the request of the Contractor once each month based upon partial pay estimates to be furnished by the Contractor and approved by the Engineer. In preparing estimates for partial payments, the material delivered to the site and preparatory Work done may be taken into consideration. The Engineer reserves the right to alter quantities claimed in the partial estimate to reflect what are, in his/her opinion, the true quantities for the payment time period.

The Owner may withhold such amounts from any payments as may be necessary to protect himself/herself from loss on account of:

1. Defective Work not remedied,
2. Claims filed or reasonable evidence indicating probable filing of claims.
3. Failure of Contractor to make payments properly to subcontractors for material or labor,
4. A reasonable doubt that the Contract can be completed for the balance then unpaid, and
5. Damage to another Contractor.

When the above causes justifying withholding of funds are removed, payment shall be made for amounts withheld because of them.

Disbursement of monies by the City hereunder shall be subject to set-off pursuant to the provisions of Section 2.611 of the Code of Ordinances.

108—1.08 PAYMENT FOR MATERIAL ON HAND

Partial payment may be made for the actual cost of materials meeting the applicable specifications stockpiled on or in the vicinity of the Project for future incorporation into the Work, not to exceed fifty (50) percent of the total price of the Contract pay item provided under the Contract for which the materials have been furnished. No payment for stockpiled material will be made for perishable materials such as portland cement, asphalt, and others that could be rendered useless because of long storage periods.

In no case shall payment be considered without receipt of invoices verifying material costs and shipping charges.

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

108—1.09 PAYMENT OF BILLS BY CONTRACTORS

The Contractor shall promptly make full payment for labor, materials, supplies, and provisions at such times as they become due and payable to all persons supplying said Contractor or his/her subcontractor with labor, services, materials, supplies, or provisions for the prosecution of the Work provided for in the Contract, and he/she shall not permit any lien or claim to be filed or

prosecuted against Owner for or on account of any labor, services, material, supplies or provisions furnished.

In the event that Contractor fails, neglects, or refuses to make prompt and full payment of any claim for labor, services, materials, supplies, or provision furnished by any person in connection with the Contract, whether the labor, services, materials, supplies or provisions to be performed or are furnished for the Contractor or for a subcontractor, then, and in such event, the Owner may withhold the amount of such claim by the person or persons furnishing such labor, services, materials, supplies, or provisions and deduct the amount thereof from funds due or to become due to the Contractor by reason of the Contract. The deduction of any such amounts because of claims in the manner herein authorized will not, however, relieve the Contractor or his/her surety from his/her or its obligation with respect to any unpaid claims. Sums withheld for the purpose named herein will be paid to the Contractor upon certification that said claims have been paid.

108—1.10 PAYMENT FOR SURPLUS SPECIALTY MATERIALS

Special materials, necessary for the Work, that become surplus due to cancellation, suspension, or alteration of the Work by written order of the Engineer, may be purchased by the Owner from the Contractor at actual invoice cost plus freight. In order to be eligible for purchase said specialty materials must have been shipped from the supplier and delivered to the Contractor prior to the date of the written order altering the Work which makes the specialty materials surplus.

Specialty materials are defined as manufactured materials not available locally and not normally stocked by local suppliers.

No payment shall be made for specialty materials in excess of the minimum quantity required for the Work prior to the alteration of Work.

The Contractor, at no additional cost to the Owner, shall deliver all specialty materials purchased as provided herein, to a storage site designated by the Owner and provide such proof of cost of the specialty materials as the Owner may require.

108—1.11 ACCEPTANCE AND FINAL PAYMENT

When the Contractor determines that the Work or a designated portion thereof acceptable to the Owner is substantially complete, the Contractor shall notify the Engineer requesting an inspection and prepare and submit a list of items remaining to be completed for final completion.

When the Engineer, on the basis of an inspection, determines that the Work is substantially complete, he/she will then prepare a Certificate of Substantial Completion which shall establish the Date of Substantial Completion, state the responsibilities of the Owner and the Contractor for maintenance, heat, utilities, and insurance, include the list of items that require completion or correction before total completion is achieved. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. The Certificate of Substantial Completion shall fix the time within which the Contractor shall complete the items listed therein. The Certificate of Substantial Completion shall be submitted to the Owner and the Contractor for their written acceptance and agreement of the responsibilities assigned to them in such Certificate.

The Date of Substantial Completion of the Work or designated portion thereof is the Date certified by the Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner may occupy the Work or designated portion thereof for the use for which it is intended.

Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Engineer will promptly make such inspection and, when he/she finds the Work acceptable under the Contract Documents and the Contract fully performed, he/she will promptly issue a final Certificate for Payment stating that to the best of his/her knowledge, information and belief, and on the basis of his/her observations and inspections, the Work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance, less appropriate deductions, found to be due the Contractor, and noted in said final Certificate, is due and payable.

108—1.11 ACCEPTANCE AND FINAL PAYMENT

Before issuance of final certificate, the Contractor shall submit evidence satisfactory to the Engineer that all payrolls, material bills, and other indebtedness connected with the Work have been paid.

In accordance with the provisions of the Contract between the City and the Contractor, the Contractor's Surety Company must consent to final payment before issuance of final certificate by the Engineer.

108—1.12 DEDUCTIONS FOR UNCORRECTED WORK

If the Engineer deems it inexpedient to correct Work that has been damaged or that was not done in accordance with the Contract, an equitable deduction from the Contract price shall be made therefore.

108—1.13 GENERAL GUARANTY

Neither the final certificate of payment nor any provision in the Contract nor partial or entire use of occupancy of the premises by the Owner shall constitute an acceptance of Work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the Work resulting therefrom which shall appear within a period of one (1) year from the date of substantial completion of the Work unless a longer period is specified. The Owner or Engineer will give notice of observed defects with reasonable promptness.

END OF SECTION

SECTION 109

RESERVED

PART II

TECHNICAL PROVISIONS

SECTIONS 110 — 700

SECTION 110 MOBILIZATION

110—1.00 GENERAL

110—1.01 DESCRIPTION

A. Mobilization:

This item shall consist of the preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; for the establishment of all offices, buildings and other facilities, necessary for the work on the project, and for all other work and operations which must be performed, or costs incurred, prior to beginning work on the various items on the project site.

This item shall also consist of final project closeout and cleanup operations, including, but not limited to, those necessary for the removal of equipment, supplies, incidentals, and debris from the project site, cleaning the streets and sidewalks of all soils and construction debris, record drawings, correction of deficiencies in the work, and for all other work required by the Engineer which must be performed, or costs incurred, prior to final project acceptance by the City not paid for by other contract pay items. The City Engineer has established that the bid amount for this item shall be a minimum amount of five percent of the total bid amount. If the Contractor fails to bid an amount equal to or greater than the minimum amount then five percent of the total bid amount will be entered by the City for this item.

110—4.00 MEASUREMENT AND PAYMENT

110—4.01 MEASUREMENT

1. Partial Payment for Mobilization:

- a. When five percent of the original Contract amount is earned from other bid items, fifty percent of the amount bid for mobilization or five percent of the total bid amount, whichever is lesser, will be paid.
- b. Upon completion of all work on the project, the remainder of the amount bid for mobilization will be paid.

110—4.02 PAYMENT

The item of mobilization measured as noted herein will be paid for at the Contract lump sum bid.

When the proposal contains Item 110(1), Mobilization, it shall be understood that the Contractor's mobilization expenses (otherwise chargeable to individual items) are compensated for in full under Item 110(1), and that no adjustments shall be made in the Contract price for mobilization due to under-runs or overruns in quantity.

110—4.02 PAYMENT

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
110(1)	Mobilization	Lump Sum

END OF SECTION

SECTIONS 111 and 112

RESERVED

SECTION 113 FLAGGING

113—1.00 GENERAL

113—1.01 DESCRIPTION

A. Work Included:

Work under this section shall include the furnishing of competent flagmen, including all necessary equipment, to insure the safety of the traveling public, as authorized by the issuance of a work order.

B. Related Work Described Elsewhere:

Section 115 Traffic Maintenance

C. Work Installed but Furnished Under Other Directives:

Not Used

D. Work Furnished but Not Installed:

Not Used

113—1.02 QUALITY ASSURANCE:

A. Not Used

113—1.03 SUBMITTALS

A. Not Used

113—1.04 PRODUCT/MATERIAL HANDLING

A. Not Used

113—2.00 PRODUCTS

113—2.01 MATERIALS STANDARDS

A. Not Used

113—3.00 EXECUTION

113—3.01 EXECUTION

A. General:

All flagging operations shall be in accordance with the procedures outlined in the “Alaska Traffic Manual” and as shown on the plans.

The Contractor shall at all times be responsible for the protection of the work and the traffic, and the Contractor and the Contractor’s surety shall be liable for any damage or injuries suffered by reasons of the Contractor’s operations or the Contractor’s failure to provide such service.

The Contractor’s equipment shall stop at all points of intersection with the traveling public outside of the project limits, unless satisfactory traffic control measures, approved in writing, are installed and maintained at the Contractor’s expense.

113—4.00 MEASUREMENT AND PAYMENT

113—4.01 GENERAL

- A. Flagging shall not be paid for unless the work has been authorized in writing by the Engineer.

113—4.02 MEASUREMENT

- A. Payment for flagging shall be limited to such flagging operations as deemed essential for the safety and convenience of the traveling public. Flagging shall be measured for payment as the number of man-hours of flagging authorized and approved including all necessary equipment.

113—4.03 PAYMENT

Payment will be made at the rate per hour stated in the bid schedule for each man-hour of flagging.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
113(1)	Flagging	Man—hours

END OF SECTION

SECTION 114 CONSTRUCTION SURVEYING BY THE CONTRACTOR

114—1.00 GENERAL

114—1.01 DESCRIPTION

A. Work included:

The work shall consist of all surveying and staking essential for the completion of the project in conformance with the plans and specifications, and all necessary calculations required to accomplish the work.

B. Related work described elsewhere:

1. General Conditions Section 103—1.10
2. General Conditions Section 104—1.08

C. Work installed but furnished under other directives:

Not Used

D. Work furnished but not installed:

Not Used

114—1.02 QUALITY ASSURANCE

A. In addition to complying with all pertinent codes and regulations, all staking, surveying, computations, and calculations shall be accomplished in accordance with standard surveying practice and instructions issued by the Engineer.

B. Where provisions of pertinent codes and standards conflict with this specification the more stringent provisions shall control.

C. The Contractor shall use competent personnel and suitable equipment for the layout work required and shall furnish all stakes, templates, straight edges, and other devices necessary for checking and maintaining points, lines and grades.

Upon the Engineer's request the Contractor shall provide to the Engineer evidence in form and content acceptable to the Engineer that the individual who is proposed to perform the construction staking has a minimum of three years experience in similar construction staking work in the State of Alaska, is knowledgeable in the operation of required surveying Instruments, and is capable of reading, understanding and accomplishing the construction survey work described herein.

All surveying work requiring the resetting of monuments, property corners and all permanent survey monumentation shall be accomplished under the direct control and supervision of a registered land surveyor with current Alaska registration.

D. Field notes shall be kept in standard bound notebooks in a clear, orderly and neat manner consistent with standard engineering practice. The field books shall be available for inspection by the City's project personnel at any time.

114—1.03 SUBMITTALS

A. Field Books

All field books shall become the property of the City prior to final acceptance.

114—1.04 NOT USED

114—1.05 JOB CONDITIONS

A. Existing Conditions

The plan sheets supplied to the Contractor will show the locations of existing buildings, fences, and other pertinent above ground structures as well as the approximate vertical and horizontal location of underground utilities.

114—2.00 NOT USED

114—3.00 EXECUTION

114—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

114—3.02 CONSTRUCTION REQUIREMENTS

A. General

The Contractor shall be responsible for the supervision of the construction surveying personnel, and any errors resulting from the preparations of said personnel shall be corrected at the expense of the Contractor, and at no additional cost to the City.

When pay item 114(1) appears in the bid schedule and the plans or specifications refer to “as staked by the Engineer”, it shall be construed to read “as staked by the Contractor”.

Positions of lot corners abutting the project right of way shall be preserved by the Owner. All lot corners — those abutting and those bordering the project right of way — that are destroyed or disturbed by the Contractor shall be replaced by the Contractor.

If field measurement of construction work is necessary to determine quantities or verify proper installation, that work shall be performed by the Contractor's survey crew under the supervision of the Engineer or his/her designated representative.

B. Survey Control

Position and references to the street centerline at monuments, PC's, PCC's, and PT's (horizontal control) will be provided by the Engineer. Temporary bench marks, (vertical control), will be provided at each block for the entire length of project. All additional control, alignment, or grades necessary for construction shall be the responsibility of General Contractor. All alignment and grades shall be set in a manner that can be checked by the Engineer at his/her option.

C. Final Accuracy

Installed structures which exceed the following limits of variation shall be adjusted immediately. No further structures shall be installed until inaccurate installations have been corrected.

1. Water Systems shall be installed within 0.05 feet horizontally and 0.05 feet vertically of the exact location taken from the project plans.
2. Sanitary Sewer Systems shall be installed within 0.05 feet horizontally and 0.01 feet vertically of the exact location taken from the project plans. In addition, the gradient of any ten foot section of pipe shall not vary by more than 10% of the gradient shown on the project plans.
3. Storm Drain Systems shall be installed within 0.05 feet horizontally and 0.01 feet vertically of the exact location taken from the project plans. In addition, the gradient of any 10 foot section of pipe shall not vary by more than 10% of the gradient shown on the project plans.
4. Steam Systems shall be installed within 0.05 feet horizontally and 0.05 feet vertically of the exact location taken from the project plans.
5. Condensate Systems shall be installed within 0.05 feet horizontally and 0.01 feet vertically of the exact location taken from the project plans.
6. Underground Conduit and Direct Bury Electrical or Telephone shall be installed within 0.10 feet horizontally and 0.10 feet vertically from the exact location taken from the project plans.
7. Surface Drainage Structures (including all concrete or asphalt gutters and drains) shall be installed within 0.05 feet horizontally and 0.01 feet vertically from the exact location taken from the project plans, and shall not vary more than ten percent of the gradient shown on the plans.

8. Monument Cases and the Brass Cap shall be centered to within 0.01 feet horizontally of the position as called for on the plans, and the ties to that monument. The Brass Cap shall be marked by the Owners' forces.

114—4.00	MEASUREMENT AND PAYMENT
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114—4.01 GENERAL

Construction surveying by the Contractor as specified in the bid schedule shall include furnishing all necessary personnel, equipment, transportation, and supplies to accomplish the work, unless otherwise stated.

114—4.02 MEASUREMENT AND PAYMENT

- A. Construction surveying by the Contractor.

Measurement shall be on a lump sum basis for all construction surveying required for completion of the Contract, and the resetting of all destroyed or disturbed property corners.

Payment shall be paid on a prorated basis per the number of days in the Contract.

114—4.03 BASIS OF PAYMENT

<u>Pay Item Number</u>	<u>Pay Item</u>	<u>Pay Unit</u>
114(1)	Construction Surveying by the Contractor	Lump Sum

END OF SECTION

SECTION 115 TRAFFIC MAINTENANCE

115—1.00 GENERAL

115—1.01 DESCRIPTION

A. Work Included:

This work shall consist of the necessary measures to protect and maintain traffic during the life of the contract, including the furnishing of such personnel, equipment and devices as may be required to insure the safety of the traveling public.

B. Related Work Described Elsewhere:

Section 104—1.11 Construction Traffic
Section 113 Flagging

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

115—1.02 TRAFFIC CONTROL PLAN (TCP)

The TCP shown in the plans is not a detailed procedure, but an overview of the general procedure of traffic maintenance, indicating broad sequential steps to be followed during construction. The Contractor shall follow procedures which will result in a safe traversable facility for public vehicular and pedestrian traffic.

The Contractor may be allowed to modify the TCP in the plans or design an alternate TCP. Any modifications to the TCP shall be submitted in writing for approval within thirty days of receipt of the Notice To Proceed. Changes in the TCP resulting from unforeseen circumstances may be allowed during construction provided forty-eight (48) hours are allowed for review.

115—1.03 EXTRA MAINTENANCE

If the Engineer directs special maintenance for the benefit of the traveling public, then the Contractor will be paid on the basis of unit prices or under Section 103—1.04, Extra Work. The Engineer will be the sole judge of work to be classed as extra maintenance.

115—2.00 PRODUCTS

115—2.01 MATERIALS STANDARDS

A. Materials:

All traffic control devices necessary to fulfill the requirements of this specification, including construction signs and barricades, shall be furnished by the Contractor and shall be considered incidental to Pay Item 115(1). All such devices shall conform to the design, materials, color and fabrications requirements of the “Manual on Uniform Traffic Control

Devices with Alaska Supplement". The construction signs and barricades shall be of high intensity reflective sheeting as provided in Section 615. The testing material and devices for conformance with these requirements will be optional.

115—3.00 EXECUTION

115—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

115—3.02 INSTALLATION

A. General:

The Contractor shall maintain the work during construction and until the work is accepted in accordance with Section 104—1.13. This maintenance shall be a continuous and effective effort, prosecuted on a day by day basis, with adequate equipment and personnel to the end that the roadway and structures are maintained in a safe satisfactory condition for the traveling public at all times. The Contractor shall be liable for any damage or injuries suffered by reason of the Contractor's operation or by the Contractor's failure to provide such services.

At the Pre-Construction Conference, the Contractor shall furnish a complete phase traffic maintenance plan for the approval of the Engineer. The traffic maintenance plan shall contain the detailed procedures the Contractor proposes to implement the TCP. No work shall be started prior to approval of the traffic maintenance plan. The Contractor shall give 72 hours notification to the Engineer before starting any work that might inconvenience the traveling public or change existing travel patterns.

Unless otherwise provided, the roadway undergoing improvements shall be kept open to all traffic by the Contractor. All locations requiring redirection or stopping of the traveling public shall be properly signed and/or flagged by the Contractor. The Contractor's equipment shall stop at all points of intersection with the traveling public unless satisfactory traffic control measures, approved in writing are installed and maintained at the Contractor's expense.

Construction shall be conducted so as to cause as little inconvenience as possible to abutting property owners. The Contractor shall provide and maintain in a safe passable condition

temporary approaches, crossings and intersections with trails, streets, businesses, parking lots, residences, garages, and farms. When the abutting owners' access road across the right of way line is to be eliminated and replaced under the contract, the existing access shall not be closed until replacement access facility is available.

Open trenches, ditches, pavement edge drop-offs and other excavations and hazardous areas shall be protected with barricades and adequately delineated.

When the Contractor is required to maintain traffic through grading, roadway excavation and embankment areas, the construction shall be conducted in such a manner as to provide a reasonably smooth and even surface satisfactory for use by public traffic at all times. The surface of the roadbed shall be properly crowned for drainage. In advance of other grading operations, sufficient fill shall be placed at culverts and bridges to permit traffic to cross unimpeded. Part width construction techniques shall be employed when the traffic is routed through roadway cuts or over embankments under construction. The material shall be excavated or placed in layers and the construction activities shall be alternated from one side to the other, with traffic routed over the side opposite the one under construction.

The Contractor shall post a notice to the public in a local daily and weekly newspaper advising the public of the project boundaries including a scale map showing the project area and suggested detour routes, the project time limits, the General Contractor's name, and the need to be alert for construction signs and traffic control. The notice, dimensioned 3" x 5" minimum, shall appear once fourteen (14) days prior to the start of work and continuously for seven (7) days beginning five (5) days before the start of work.

All traffic control devices used by the Contractor shall be placed and maintained in accordance with the requirements as specified in the Manual on Uniform Traffic Control Devices With Alaska Supplement, or as directed by the Engineer. No construction operation will be allowed to commence until the Contractor has obtained the proper signs and placed them as required by the Engineer. Hastily made hand painted signs and barricades will not be permitted.

The Contractor shall be required to: maintain pedestrian access to all residences and business in the construction zone; maintain vehicle access for emergency vehicles, fire trucks, ambulances and police vehicles; provide barricades, and flagging personnel as necessary while working all areas and in particular busy intersections on the project. Ditch openings which isolate businesses and other areas as specified by the Engineer shall be provided with an approved bridge system capable of withstanding traffic loads to these areas. No road or business driveway may be closed without the approval of the Engineer unless the Contractor has received written authorization from the Owner affected.

At no time will the Contractor have more than one thousand feet (1,000') of trench open, nor more than two (2) intersections closed to vehicular traffic, except with specific written permission of the Engineer. Pedestrian access crossings suitably equipped with handrails shall be provided as directed by the Engineer. The cost of such crossings, if required, shall be incidental to this bid item.

Barricade warning lights shall be provided and maintained at all barricades and at all other points where directed by the Engineer shall be kept continuously functioning from one (1) hour before sunset until one (1) hour after sunrise.

The Contractor is required to notify the following Agencies at least twenty-four (24) hours prior to starting any work which might inconvenience or endanger vehicular traffic. Information on project area, duration, and detour routes should be provided.

City Police Department	459-6500
City Fire Department	459-6500
State Troopers	451-5100
Borough Transit	459-1002
Traffic Signals (DOT/PF)	451-2323
Storm Drain/Street Lights City Public Works	459-6707

UTILITY BREAKS — Notify Immediately:

Aurora Energy District Heat	452-2625
Golden Heart Utilities Water * Sewer	455-4444
Golden Valley Electric (GVEA) (24 Hours)	452-4832
ACS Telephone	611
GCI Cable	611 or 374-0611

Utility locations can be marked by the above agencies prior to construction with a forty-eight (48) hour notice.

Where so provided on the plans, or otherwise approved, the Contractor may by—pass traffic over a detour route. When no longer required, the detour shall be removed and the approaches obliterated.

When, in the opinion of the Engineer, conditions are such that the safety and/or convenience of the traveling public is adversely affected, the Contractor shall be immediately notified in writing. The notice shall state the defect(s) and the corrective action(s) required. In the event that the Contractor neglects to take immediate corrective action, the Engineer may suspend all work on the project until satisfactory corrective action is performed. In the event the Contractor does not take corrective action within 24 hours, the Engineer may order such work as deemed necessary for public convenience and safety accomplished by outside forces. The cost of this work shall be deducted from any monies due or that may become due under the terms of the contract.

B. Traffic Maintenance During Suspension of Work:

Prior to suspension of the work, the Contractor shall make passable and shall open to traffic such portions of the project and temporary roadways or portions thereof as may be agreed upon between the Contractor and the Engineer for the temporary accommodation of necessary traffic during the anticipated period of suspension.

Thereafter, and until issuance of an order for the resumption of construction operations, the maintenance of the temporary route or line of travel agreed upon will be by and at the expense of the Contractor, except as hereinafter specified. Snow removal will be performed by the Owner's forces.

When work is resumed, the Contractor shall replace or renew any work or materials lost or damaged because of such temporary use of the project; shall remove to the extent directed any work or materials used in the snow removal operations of the Owner; and shall complete the project in every respect as though its prosecution had been continuous and without interferences. All additional work caused by such suspensions, for reasons beyond

the control of the Contractor, will be paid for at the contract prices or at prices established for extra work.

If the suspension of work is due to failure on the part of Contractor to correct conditions unsafe for workers or the general public, or to carry out orders given, or to perform any provisions of the Contract, then and in such event, the Contractor shall bear the costs of maintaining the roadways under traffic during the period of suspension.

C. Construction Signing:

The Contractor shall furnish and erect, move, and remove, as required and directed the series C construction signs, construction barricades and/or temporary guide markers and pavement marking required to adequately and safely inform and direct the traveling public and to satisfy legal requirements.

All construction signs shall be kept clean, mounted at the required height and placed to be effective day and night. All signs and markers shall indicate actual existing conditions and shall be moved, removed, relocated or changed immediately as directed to reflect changed conditions. The number of signs indicated on the Standard Drawings and plans are a minimum and the Contractor shall have an adequate quantity of each type of signs immediately available for use as required. The Engineer may, if unsafe conditions exist, require additional signs placed.

D. Temporary Marking of Pavement:

This work, when required in the plans, includes furnishing and applying all temporary pavement markings, the removal thereof, and the delineation of paved detours which are on surfaces to be abandoned or removed. All temporary traffic markings shall be applied prior to opening the surfaces to traffic.

The markings to be used are prefabricated plastic markings consisting of white or yellow pigmented plastic with reflective glass spheres uniformly distributed throughout their entire cross sectional area, which are capable of being affixed to bituminous concrete pavements by a pressure sensitive pre-coated adhesive. The markings shall be provided complete in a form that will facilitate rapid application and protect the markings in shipment and storage. The manufacturer, when bidding, shall identify proper solvents and/or contact cement to be applied at the time of application, all equipment necessary for proper application, and recommendations for application that will assure an effective performance life. The marker material shall mold itself to pavement contours, breaks, faults, and the like, by action of traffic at normal pavement temperatures. The plastic shall have resealing characteristics, such that it will fuse with itself and with previously applied marking materials of the same composition under normal conditions of use.

Prefabricated legends and symbols shall conform to the applicable shapes and sizes as outlined in the "Manual on Uniform Traffic Control Devices for Streets and Highways" as modified.

The markings must be removed without damage to the pavement when the detour is no longer needed.

E. Portable Concrete Protective Barrier:

When required, the Contractor shall provide a system of continuous barrier to be installed in accordance with the TCP. This work shall include the furnishing, placement, relocation, maintenance and removal of pre-cast concrete barrier sections, ten feet or more in length, and constructed in accordance with the details shown on the plans. Barriers shall be placed in accordance with the plans before commencing work which is to be protected and before traffic is diverted. Barriers shall remain the property of the Contractor upon completion of the work.

115—4.00 MEASUREMENT and PAYMENT

115—4.01 GENERAL

Not Used.

115—4.02 MEASUREMENT

When the bid schedule contains a lump sum item, no measurement of quantities will be made.

Traffic maintenance shall be measured by lump sum.

Construction signs shall be incidental to Pay Item 115(1).

Temporary pavement markings shall be incidental to Pay Item 115(1).

Portable concrete barriers shall be incidental to Pay Item 115(1).

115—4.03 PAYMENT

Traffic Maintenance:

Payment at the Contract lump sum price shall be full compensation for furnishing all labor, materials and equipment as may be required to protect and maintain traffic and to insure the safety of the traveling public.

Traffic maintenance shall be paid on a prorated basis per the number of days in the Contract.

Payment shall be made under:

<u>Pay Item Number</u>	<u>Pay Item</u>	<u>Pay Unit</u>
115(1)	Traffic Maintenance	Lump Sum

Price Adjustments:

Under this section, traffic maintenance for Extra Work, Extension of Time, and for Noncompliance with Requirements will be adjusted on a daily ration; adjustments will be applied only to the portion of the project which has not been approved and accepted for maintenance.

The Contract price for the applicable item of work will be adjusted as follows:

1. Extra Work and Extension of Time:

When the Contract time is extended by authorized extra work or by delays which are not the fault of the Contractor, as determined by the Engineer, the lump sum amount for Traffic Maintenance will be increased by the product of the ratio that the additional days are to the original Contract time multiplied by the lump sum.

2. Noncompliance with Requirements:

After due notification by the Engineer, in writing, of the lack of compliance with the requirements of Contract Pay Item 115(1), failure to rectify such lack will result in a reduction in the lump sum for each day that such deficiency exists. The amount of reduction for the first day will be an amount equal to the product of the fraction, one divided by the Contract time, multiplied by the applicable lump sum.

The amount of reduction in price for each succeeding day thereafter that the deficiency continues to exist will be double the amount computed for the first day.

END OF SECTION

SECTIONS 116 - 199

RESERVED

DIVISION 200

EARTH WORK

SECTION 201 CLEARING AND GRUBBING

201—1.00 GENERAL

201—1.01 DESCRIPTION

This work shall consist of removing and disposing of all vegetation and debris, including earthen materials incidentally removed with vegetation and debris, from within the right of way and easement areas. Vegetation and debris may include existing berm piles from previous construction, minor right of way encroachments consisting of, but not limited to, fences and signs, and the selected clearing of areas designated on the plans.

A. Work Included:

Not Used

B. Related Work Described Elsewhere:

Not Used

C. Work Installed but Furnished Under Other Directives:

Not Used

D. Work Furnished but Not Installed:

Not Used

201—1.02 QUALITY ASSURANCE:

A. Qualifications of Manufacturers:

Not Used

B. Qualifications of Installers:

Not Used

C. Codes and Standards:

Not Used

D. Source Quality Control:

Not Used

201—1.03 SUBMITTALS

Not Used

201—1.04 PRODUCT/MATERIAL HANDLING

Not Used

201—2.00 PRODUCTS

Not Used

201—3.00 EXECUTION

201—3.01 CONDITIONS

A. Inspections:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

201—3.02 INSTALLATION

A. General:

The Engineer will designate the limits of work and all trees, shrubs, plants and other things to remain. Paint required for cut or scarred surfaces of trees or shrubs selected for retention shall be an approved asphaltum base paint prepared especially for tree surgery.

B. Clearing and Grubbing:

All surface objects and all trees, stumps, roots and other protruding obstructions, including berm piles left from previous construction not designated to remain, shall be cleared and grubbed, except undisturbed stumps and roots and inorganic solid objects which shall be a minimum of four feet below subgrade or slope of embankment.

The Engineer may permit sound stumps to be cut off not more than six inches above the ground and to be left outside the construction limits of cut and embankment areas, except in the area to be rounded at the top of backslopes where stumps shall be cut off flush with or below the surface of the final slope line.

Except in areas to be excavated, stump holes and other holes from which obstructions are removed shall be backfilled with suitable materials and compacted in accordance with the contract.

All burning shall be under the constant care of competent personnel on watch at such times and in such a manner that anything designated to remain on the right of way, the

surrounding forest cover or other adjacent property will not be jeopardized. Burning shall be done in accordance with applicable laws and ordinances.

All merchantable timber in the clearing area which has not been removed from the right of way prior to the beginning of construction shall become the property of the Contractor unless otherwise provided for in the Special Provisions.

When permitted by the Engineer, materials and debris may be removed from the right of way and disposed of at locations off the project with the written permission of the property owner on whose property the materials and debris are placed. The Contractor shall make all necessary arrangements with property owners for obtaining suitable disposal locations and the cost involved shall be included in the unit price bid.

Low hanging branches and unsound or unsightly branches on trees or shrubs designated to remain shall be removed as directed. Branches of trees extending over the road shall be trimmed to give a clear height of twenty-two feet above the road surface. All trimming shall be done by skilled workers and in accordance with good tree surgery practices.

C. Hand Clearing:

In areas shown on the plans or designated by the Engineer as hand clearing, no equipment on wheels or tracks shall be used, except as stated below. Due care shall be taken during the clearing operations so as not to disturb the grass and/or moss cover. Stumps shall be cut flush with the ground in lieu of grubbing, or left a maximum of twelve inches above the natural ground where the minimum cover below subgrade will be four feet.

Where shown on the plans, specific areas may be cleared by means of a mechanical brushcutter, provided such work is performed within the time frame specified in the Special Provisions.

Where shown on the plans, clearing debris under four inches in diameter, may be disposed of within the construction limits by spreading in an even layer, provided the material shall not intrude into the upper four feet of subgrade.

In hand clearing areas, piles for burning shall be placed well to side of the roadway prism, in open spaces within the right of way, or in spaces designated by the Engineer where no damage to trees, other vegetation or stability of the roadway foundation will occur.

D. Selected Tree Removal:

Selected trees, which will be designated by the Engineer, and which are located outside the normal clearing and grubbing limits, shall be removed and disposed of in accordance with the applicable portions of this Section. Selective Tree Removal may include leaning or dangerous trees and snags regardless of size, which in the opinion of the Engineer should be removed. Designation by the Engineer of the trees to be removed under this item may occur at any time during the life of the contract and may be subject to conditions in Section 201—3.02.C Hand Clearing. Trees designated for selective removal shall be cut off no more than six inches above the ground surface.

201—4.00 MEASUREMENT AND PAYMENT

201—4.01 GENERAL

Payment for clearing and grubbing will not be made until the work is complete.

201—4.02 MEASUREMENT

Measurement will be by one or more of the following methods, and shall include the removal and disposal of all materials in an acceptable manner.

A. Area Basis:

The work to be paid for will be the number of acres and fractions thereof, acceptably cleared and grubbed within the limits as staked for clearing and grubbing. Areas not shown on the plans or not staked for clearing and grubbing will not be measured for payment.

Areas within the clearing and grubbing limits, which do not require clearing and grubbing, will be so staked and will not be included in the measurement for clearing and grubbing. Areas not included for measurement of clearing and grubbing shall be areas covered by existing roadway, lakes, ponds, existing stream beds and other areas not cornered by trees or brush.

Existing berm piles consisting of soil, rubbish and/or organic materials from previous construction that lie within the clearing and grubbing limits as staked, shall be removed and disposed of under the clearing and grubbing item, and no additional measurement shall be made. Existing berm piles beyond the staked area, within the highway right of way, may be separately staked for removal and disposal and shall be measured as additional areas of clearing and grubbing.

B. Lump Sum Basis:

When the bid schedule contains a clearing and grubbing lump sum item, no measurement of quantities will be made.

C. Selective Tree Removal:

Trees designated to be removed under this item shall be measured by the number of trees acceptable removed, and disposed of, regardless of size.

201—4.03 PAYMENT

The accepted quantities of clearing and grubbing will be paid for at the contract unit prices as follows:

A. Area Basis:

The quantities determined will be paid for at the contract unit price per acre, respectively; for each of the particular pay items listed that appear in the bid schedule.

B. Lump Sum Basis:

When the bid schedule contains a lump sum item, the contract lump sum price will be paid and shall be full compensation for all clearing and grubbing required for construction of the project.

C. Selective Tree Removal:

The quantity of selected trees removed will be paid for at the contract price per unit of measurement completed and accepted.

Payment will be made under:

<u>Pay Item Number</u>	<u>Pay Item</u>	<u>Pay Unit</u>
201(1A)	Clearing	Acre
201(B)	Clearing	Lump Sum
201(2A)	Clearing and Grubbing	Acre
201(2B)	Clearing and Grubbing	Lump Sum
201(3A)	Hand Clearing	Acre
201(3B)	Hand Clearing	Lump Sum
201(4)	Selective Tree Removal	Each

END OF SECTION

SECTION 202 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

202—1.00 GENERAL

202—1.01 DESCRIPTION

A. Work Included:

This work shall consist of the removal, wholly or in part, and satisfactory disposal of all buildings, fences, structures, old pavements, abandoned utilities, and any other obstructions which are not designated or permitted to remain, except for the obstructions to be removed and disposed of under other items in the contract. It shall also include the backfilling of the resulting trenches, holes and pits. When the proposal does not include pay items for removal of structures and obstructions as set out in this section, such work shall be performed under Section 203 or as specified. Also included in the work will be the removing and resetting of mail boxes and newspaper delivery tubes and the preservation from injury and defacement of all vegetation and objects not scheduled to be removed.

B. Related Work Described Elsewhere:

Section 203 Excavation and Embankment
Section 205 Structure Excavation for Conduits and Minor Structures

C. Work Installed but Furnished Under Other Directives:

Not Used

D. Work Furnished but Not Installed:

Not Used

202—1.02 QUALITY ASSURANCE

A. Not Used

202—1.03 SUBMITTALS

A. Not Used

202—1.04 PRODUCT/MATERIAL HANDLING

A. Not Used

202—2.00 PRODUCTS

202-2.01 MATERIALS STANDARDS

A. Not Used

202—3.00 EXECUTION

202—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

202—3.02 INSTALLATION

A. General:

The Contractor shall remove all structures, foundations, fences and other obstructions within the right of way that interfere with construction of the work and are not otherwise designated for preservation.

All removed materials designated for reuse or relocation work shall be removed, stored, and otherwise protected in such a way that their suitability for reuse is preserved.

All removed materials not designated for reuse on the project shall be disposed of at the Fairbanks North Star Borough Sanitary Landfill or other Contractor—selected site consistent with law and subject to approval of the Engineer.

B. Removal of Bridges, Culverts, and other Drainage Structures:

Bridges, culverts and other drainage structures in use by traffic shall not be removed until satisfactory arrangements have been made to accommodate traffic.

The Contractor shall not remove manholes, inlets, valves or any other portion, or portions, of the sewer or water systems until the new systems are in operation or suitable arrangements have been made for the diversion, interruption or a temporary system has been installed.

When designated on the plans to be abandoned in place, flexible pipe shall have the ends crushed and flattened before covering; other conduits shall be securely plugged by an approved method.

Unless otherwise directed, the substructures of existing structures shall be removed down to the natural stream bottom and those parts outside of the stream shall be removed down one foot (1') below natural ground surface. Where such portion of existing structures lie wholly or in part within the limits for a new structure, they shall be removed as necessary to accommodate the construction of the proposed structure.

Upon removal of existing bridges, all slopes or embankments shall be dressed according to the plan details. Slopes not designated in the plans shall be dressed to conform to the natural ground surface or a 2 to 1 slope, or blended as directed. Dressing slopes shall include filling excavations or depressions.

Blasting or other operations necessary for the removal of an existing structure or obstruction, which may damage new construction, shall be completed prior to placing the new work.

C. Removal of Pipe:

When the Bid Schedule contains an item for the "Removal and Disposal of Culvert Pipe", the pipe to be removed will become the property of the Contractor.

D. Removal of Pavement, Sidewalks, Curbs, Etc.

All concrete pavement, base course, sidewalks, curbs, gutters, etc., designated for removal, shall be disposed of in an acceptable manner.

In removing pavements, curbs, walks, driveways and similar structures, all cuts where an abutting structure or a part of a structure is to be left in place shall have clean, vertical cuts made true to designated lines.

E. Relocation of Mailboxes:

The Contractor shall relocate existing mailboxes to a location specified by the Engineer. The relocated boxes shall be installed on new supports, unless specifically directed otherwise in the plans.

202—4.00 MEASUREMENT AND PAYMENT

202—4.01 GENERAL

- A. Removal of any structure or obstruction shall not be paid for until the structure or obstruction has been removed and properly disposed.

202—4.02 MEASUREMENT

- A. When the Contract stipulates that payment will be made for removal of obstructions on a lump sum basis, the item, Removal of Structures and Obstructions, will include all structures and obstructions encountered within the right of way that interfere with construction of the work and are not otherwise designated for preservation.
- B. If no Pay Item appears in the bid schedule for lump sum removal of structures and obstructions any removal and disposal or re— installation required shall be paid for through pay items for removal of specific items if they occur in the bid schedule or be considered incidental to structure excavation or unclassified excavation as applicable.
- C. When the bid schedule stipulates pay items for removal of specific structures measurement will be made by the unit stipulated for that pay item.

- D. Mailbox relocation shall be measured separately for each installation, complete in place. Temporary relocation of mail boxes will not be measured for payment, but will be considered incidental.
- E. The length of pipe removed will be measured in linear feet.

202—4.03 BASIS OF PAYMENT

- A. The accepted quantities of removal of structures and obstructions, determined as provided above will be paid for at the contract lump sum price, which price and payment will be full compensation for removing and disposing of the obstructions in accordance with the contract.
- B. Specific obstruction items, including pipe removal, stipulated for removal under unit price pay items, will be paid for at the contract price per unit specified in the proposal, which price shall be full compensation for removal and disposal of such items, excavation and subsequent backfill incidental to their removal. The price shall also include salvage of materials removed, their custody, preservation, storage on the right of way and disposal as provided herein.
- C. Payment as stated above shall be full compensation for furnishing all required materials, labor, equipment and incidentals to provide a complete facility.
- D. Mail box relocation shall be paid for separately, complete in place for each mail box relocated.

Payment will be made under:

<u>Pay Item Number</u>	<u>Pay Item</u>	<u>Pay Unit</u>
202(1)	Removal of Structures and Obstructions	Lump Sum
202(2)	Removal of Pavement	Square Yard
202(3)	Removal of Sidewalk	Square Yard
202(4)	Removal of Culvert Pipe	Linear Foot
202(5)	Removal of Manholes	Each
202(6)	Removal of Junction Boxes	Each
202(7)	Removal of Inlets	Each
202(8)	Removal of Curb and Gutter	Linear Foot
202(9)	Single Mail Box Installation	Each
202(10)	Multiple Mail Box Installation	Linear Foot
202(11)	Mail Box Relocation	Each

There will be no separate payment for excavating for removal of structures and obstructions or for backfilling and compacting the remaining cavity.

The work of crushing and flattening or plugging the ends of conduits to be abandoned in place will not be paid for separately, but will be considered incidental to other items of work that appear in the bid schedule.

END OF SECTION

SECTION 203 EXCAVATION AND EMBANKMENT

203—1.00 GENERAL

203—1.01 DESCRIPTION:

A. Work Included:

This work shall consist of the excavation and embankment construction and the disposal or compaction of all material, not being removed under some other item, which is encountered within the limits of the work necessary for the construction of the roadway in accordance with the specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or as established. All excavation will be classified as “common excavation”, “rock excavation”, “unclassified excavation”, “muck excavation”, or “borrow” as hereinafter described.

B. Related Work Described Elsewhere:

Section 201, Clearing and Grubbing
Section 304, Subbase

C. Work installed But Furnished Under Other Directives

Not Used

D. Work Furnished But Not Installed:

Not Used

203—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used

B. Qualifications of Installers:

Not Used

C. Codes and Standards:

- | | | |
|----|--|-----------------|
| 1. | Alaska T-3, T-11
AASHTO T205, T238
Method A or C | Field Density |
| 2. | AASHTO T180-D
Alaska T-12 | Optimum Density |
| 3. | Alaska T-7 | Sieve Analysis |

D. Source Quality Control:

1. The Contractor shall provide to the Engineer the source of the Borrow and/or Select Gravel, two weeks prior to its proposed incorporation into the work. The Engineer will test the material and notify the Contractor of its acceptability.

203—1.03 SUBMITTALS

- A. Not Used

203-1.04 PRODUCT/MATERIAL HANDLING

- A. Select Gravel shall be placed such that it will not be mixed with deleterious material during installation.

203-2.00 PRODUCTS

203—2.01 MATERIALS STANDARDS:

- A. General:

Materials shall conform to the standards listed in these specifications. All fill materials required shall be provided by the Contractor from an approved source.

- B. Common Excavation:

Common excavation consists of all excavation not included as rock excavation or excavation which is otherwise classified and paid for.

- C. Rock Excavation:

Rock excavation shall consist of the excavation of igneous, metamorphic, and sedimentary rock which cannot be excavated without blasting or the use of rippers.

- D. Unclassified Excavation:

Unclassified excavation shall consist of the excavation and disposal of all materials of whatever character encountered in the work.

- E. Muck Excavation:

Muck excavation shall consist of the removal and disposal of deposits of soils and organic matter not suitable for foundation material regardless of moisture content.

- F. Borrow:

Borrow shall consist of any material conforming to the requirements of the type(s) specified in the plans, required for the construction of embankments or for other portions of the work. Borrow materials shall be Type A or Type B and conform to the requirements of Section 703—2.12.

All borrow material shall be obtained from approved sources; however, this does not relieve the Contractor from the full responsibility for the quality and quantity of material used.

The Contractor shall notify the Engineer sufficiently in advance of opening any borrow areas so that cross section elevations and measurements of the ground surface after stripping may be taken, and if necessary, the borrow material can be tested before being used. All borrow Type A shall be alluvial material.

G. Unclassified Fill:

Unclassified fill shall consist of suitable material removed as part of unclassified excavation and shall be used to fill all nonstructural areas as designated on the plans.

Unclassified fill shall be earth, sand, gravel, rock, or combinations thereof and shall contain no mulch, peat, frozen material, roots, sod, or other deleterious matter and shall be compacted to a minimum of eighty percent (80%) of optimum density.

H. Select Gravel:

Select Gravel shall consist of the material specified in the plans required for the construction of embankments or for other portions of the work. Select gravel shall conform to the requirements of Section 703—2.13.

All select gravel shall be obtained from approved stockpile sources. However, this does not relieve the Contractor from the full responsibility for the quality and quantity of material used.

The Contractor shall notify the Engineer of the intended select gravel source, allowing sufficient time for material testing before its use. As noted in Section 203—1.02,D.

203—3.00 EXECUTION

203—3.01 CONDITIONS:

A. Inspection:

Prior to all work in this section, carefully inspect the installed work of all other trades and verify that all work is complete to the point where this installation may properly commence.

Verify that all work may be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

Prior to commencing excavation, locate and protect all underground structures in the roadway from damage due to the Contractor's activities.

Prior to commencing the placement of fill, verify that all work required to be completed before the placing of fill has been accomplished.

B. Discrepancies:

In the event of discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

203—3.02 INSTALLATION:

A. General:

The excavation and embankments for the roadway, intersections and entrances shall be finished to reasonably smooth and uniform surfaces. No materials shall be wasted without permission of the Engineer. Excavation operations shall be conducted so that material outside of the limits of slopes will not be disturbed. Prior to beginning excavation, grading, and embankment operations in any area, all necessary clearing and grubbing in that area shall have been performed in accordance with Section 201, Clearing and Grubbing.

Unless otherwise specified, material which would classify as rock, whether the contract calls for classified or unclassified excavation, shall be excavated to a minimum depth of twelve inches below the top of the finished surface, within the limits of the roadbed, and the excavation backfilled with material designated on the plans. Care shall be taken that undrained pockets shall not be left in the surface of the rock.

Borrow material shall not be placed until after the roadway excavation has been placed in the fill. If the Contractor places more borrow than is required and thereby causes a waste of usable excavation, the amount of such waste will be deducted from the borrow quantity.

Obliteration of roadways shall include all grading operations necessary to incorporate the roadway into the new roadway and surroundings in order to provide a pleasing appearance from the new roadway. Ditches not required for drainage courses shall be filled and the roadway shall be rough graded so as to restore approximately the original contour of the ground.

Where excavation to the required depth, as shown on the plans or as required by the specifications, encounters unsuitable material, the Engineer may require the Contractor to remove the unsuitable materials and backfill to the finished graded section with approved material. The Contractor shall conduct operations in such a way that the necessary cross sectional measurements can be taken before the backfill is placed.

Soils that cannot be properly compacted in embankments may be designated as unsuitable. All unsuitable or surplus excavated material shall be disposed of at approved locations, and in an acceptable manner.

Disposal areas for unsuitable material may be at locations of the Contractor's choice outside of the right of way, with written consent of the property owner and as approved by the Engineer, and also within the right of way at approved locations. All waste areas shall be properly graded and drained. The outer limits of waste shall be feathered into surrounding grounds with no noticeable break or variation readily discernible.

Pavement removal and sidewalk removal shall be considered incidental to unclassified excavation.

B. Embankment Construction:

Embankment construction shall consist of constructing roadway embankments, including preparation of the areas upon which they are to be placed; the construction of dikes within or outside the right—of— way; the placing and compacting of approved material within the roadway areas where unsuitable material has been removed; and the placing and compacting of embankment material in holes, pits and other depressions within the roadway area. Only approved materials shall be used in the construction of embankments and backfills.

When called for on the plans or when directed, the embankment or specified portions of the embankment shall be constructed with material conforming to the requirements of Section 703—2.12 or Section 703—2.13. Such material may be obtained from unclassified excavation, rock excavation, common excavation or borrow.

Rocks, broken concrete, or other solid materials shall not be placed in embankment areas where piling is to be placed or driven, or where culvert placement is required.

When embankment is to be placed and compacted on hill sides, or when new embankment is to be compacted against existing embankments, or when embankment is built half—width at a time, the slopes that are steeper than 4:1 when measured at right angles to the roadway shall be continuously benched over those areas where it is required as the work is brought up in layers. Benching shall be sufficient width to permit operations of placing and compacting equipment. Each horizontal cut shall begin at the intersection of the original ground and the vertical sides of the previous cuts. Materials thus cut out and deemed suitable shall be incorporated into the new embankment and recompacted along with the new material at the Contractor's expense. Benching as required above, will not be measured for payment but will be considered incidental to other pay items of work.

Wherever a compacted roadway surface containing granular material, lies within three feet of subgrade, such old road surface shall be scarified to a depth of six inches and recompacted in accordance with the requirements of Sections 203—3.02(C) or 203—3.02(D).

When frozen soils are encountered in clearing or stripping operations preparatory to the placement of embankment, or in the excavation, or in undercuts in excavation areas, the Engineer shall require timely placement of the backfill or embankment materials, if such action is deemed essential to minimize deterioration or degradation of the foundation material. Embankment shall not be placed over frozen ground except when written permission is received.

Frozen material deemed acceptable shall be allowed to thaw and drain before placing in the embankment. Frozen cuts may require stage excavation, whereby thawed material is removed and the cut allowed to thaw while the Contractor works on some other portions of the project. After the material in the cut has thawed to a sufficient depth, as determined by the Engineer, the Contractor shall remove the thawed material. This operation shall be repeated until all frozen material is removed or the cut is excavated to grade. No additional compensation will be allowed for stage construction.

When muck excavation is performed at a season of the year when freezing weather is imminent, the Contractor shall place the specified backfill promptly, following the excavation work, at least up to the level of the existing ground surface. In order to assure compliance the Engineer may require that arrangements be made for the timely availability of such embankment or backfill materials prior to commencement of the stripping or excavation operations.

If embankment can be deposited on one side only of abutments, wing wall, piers or culvert headwalls, care shall be taken that the area immediately adjacent to the structure is not compacted to the extent that it will cause the overturning of or excessive pressure against the structure. The fill adjacent to the abutment of a bridge shall not be placed higher than the bottom of the backwall of the abutment until the superstructure is in place. When embankment is to be placed on both sides of a concrete wall or box type structure,

operations shall be so conducted that the embankment is always at approximately the same elevation on both sides of the structure.

Roadway embankment of earth materials shall be placed in horizontal layers not exceeding eight inches (loose measurements) for the full width of the embankment, except as required for traffic, and shall be compacted to ninety—five percent (95%) optimum density before the next layer is placed. Spreading equipment shall be used on each lift to obtain uniform thickness prior to compacting. As the compaction of each layer progresses, continuous leveling and manipulating will be required to assure uniform density. Water shall be added or removed, if necessary, in order to obtain the required density. Compaction equipment shall be routed uniformly over the entire surface of each layer.

When the excavated material consists predominantly of rock fragments or boulders of such size that the material cannot be placed in layers of the thickness prescribed without crushing, pulverizing or further breaking down the pieces resulting from excavation methods, such material may be placed in the embankment in layers not exceeding in thickness the approximate average size of the larger rocks. The rock fragments shall not be dumped in final position but shall be deposited on the fill and distributed by blading or dozing in a manner that will insure proper placement in the embankment so that voids, pockets, and bridging will be reduced to a minimum. The intervening spaces and interstices shall be filled with smaller stones and earth, as may be available from excavation so as to form a dense, well compacted embankment. All loaded and unloaded hauling equipment shall be continuously and uniformly routed over the entire width of the rock embankment. Depositing the shattered rock directly over the end of the fill from hauling equipment will not be permitted.

When embankments are to be placed over swampy or saturated ground, the Contractor may be permitted to end dump an initial lift of material of sufficient depth to support hauling equipment.

If continued hauling over a completed or partially completed embankment causes loss of stability as evidenced by pumping or rutting, or other damage, the Contractor shall repair the damaged embankment at his/her own expense and adjust his/her hauling equipment and procedures so as to avoid further damage.

Except for embankments constructed predominantly with rock, consisting of rock fragments or boulders, all embankments shall be constructed with moisture and density controls.

During grading operations the roadbed surface shall be adequately drained at all times.

Temporary surcharging shall consist of two methods: Static Surcharge and Rolling Surcharge. Static Surcharge shall remain in place until the foundation material has reached stability or the required settlement has taken place. Rolling Surcharge will consist of constructing a surcharge on top of the embankment to the specified elevation and continually advance the surcharge of the embankment as the excavation is performed ahead.

The material removed from the temporary surcharge shall be used in areas indicated on the plans. Temporary surcharge material shall not be wasted without the written approval. Compaction will not be required on material placed in the temporary surcharge until placed in final position in the embankment.

C. Construction of Embankment with Moisture and Density Control:

All embankments constructed with moisture and density control shall be constructed with approved materials placed and compacted at approximately their optimum moisture content. Embankment materials may require drying or uniform moistening prior to compaction in order to bring the moisture in the material to approximately optimum content.

All embankment shall be placed in evenly graded horizontal layers not exceeding eight inches and shall be compacted to not less than ninety— five percent (95%) of the maximum density.

Select gravel shall be placed in evenly graded horizontal layers not exceeding eight inches thick and shall be compacted to not less than ninety—five percent (95%) of the maximum density.

Maximum densities will be determined by AASHTO T180, Method D or Alaska T—12.

In—place field densities will be determined by Alaska T—3, Alaska T—11, AASHTO T205 or AASHTO T238, Method A or C.

D. Compaction of Embankments not Constructed with Moisture and Density Control:

Except for rock fills and the first layer of fills over swampy ground, embankment materials shall be deposited in layers not exceeding eight inches in thickness before compaction.

Compaction shall be obtained by routing construction equipment and/or rollers uniformly over the entire surface of each layer before the next layer is placed.

Dumping and rolling areas shall be kept separate, and no lift shall be covered by another until compaction has been completed.

E. Proof Rolling:

When proof rolling is specified the work shall be performed in accordance with the methods and equipment set forth in the special provisions.

203-4.00 MEASUREMENT AND PAYMENT

203—4.01 GENERAL

Payment for excavation will not be paid until the material to be excavated has been removed from the project limits and disposed of. Payment for Borrow or Select Gravel will not be paid for until the material is compacted in place.

203—4.02 MEASUREMENT

When payment is specified on a Plan Quantity basis, the quantities of excavation for which payment will be made will be those shown in the contract for the various items, provided the project is constructed essentially to the lines and grades shown on the plans.

When payment is specified on a volume basis, all accepted excavation and borrow shall be measured in its original position by cross sectioning. Measurements will include authorized excavation, unavoidable overbreakage in rock and slides in common excavation, not attributable to carelessness of the Contractor.

Unavoidable overbreakage due to blasting of material which would classify as rock, whether the contract calls for classified or unclassified excavation, will be measured for payment to an amount not to exceed ten percent (10%) of the actual quantity of work within the lines staked for any two adjacent stations. Volumes will be computed from the cross section measurements by the average end area method.

Rock excavation more than twelve inches below the top of the finished surface will not be measured for payment.

Cross Section measurements will be made for unsuitable materials actually excavated and removed in cut sections and in foundations for fill sections.

No measurement will be made for materials scarified in place.

Where it is impractical to measure material by the cross section method due to erratic location of isolated deposits, acceptable methods involving three—dimensional measurements may be used.

When slope rounding is specified, the quantity of excavation encompassed by the designated slope line, the original ground line, and the slope rounding line will not be measured for payment but will be considered incidental to other items of work appearing on the Bid Schedule.

When it is specified that embankment or grading is to be measured and paid for on a linear basis, the actual length will be measured in the units specified in the contract.

Where the contract does not specifically provide for payment for embankment, the work of embankment construction will not be paid for as such but will be considered incidental to the various classifications of excavation.

Borrow will be measured and paid for by the cubic yard, in accordance with Section 108.

Stripping of overburden from Owner furnished material sources shall be measured by the cubic yard within the area designated by the Engineer, in accordance with Section 108. There will be no measurement for haul for overburden stripping.

Obliteration of existing roadways shall be measured by the station unit or cubic yards of obliteration in accordance with the requirements of Section 108. Stationing shall be measured along the centerline of the roadway to be obliterated.

Existing roadways partially within the slope limits of the new embankments and not measured for payment as Roadway Obliteration shall be dressed to match the slopes of the new embankment. No payment shall be made for this work as it shall be considered incidental.

The measurement method used for Unclassified Excavation and Select Gravel shall be the "Contract Quantity Payment". The Contractor should verify the estimated quantities prior to bid. Payment shall be made for the Contract quantity unless changes to the work are authorized in writing by the Engineer or the Contractor fails to excavate to the excavation limit as shown on the plans.

Where "back slope grading" is specified, this item shall consist of all grading of back slopes behind curbs, side walks or other structures. The back grading shall be done at locations and to grades directed by the Engineer. The quantity of excavation or backfill encompassed by the designated slope line and the original ground line will not be measured for payment but will be considered incidental to this bid item.

203—4.03 PAYMENT

The accepted quantities of excavation and embankment material will be paid for at the contract price per unit of measurement for each of the pay items listed below that is included in the bid schedule, completed and accepted.

Payment will be made under:

<u>Pay Item Number</u>	<u>Pay Item</u>	<u>Pay Unit</u>
203(1)	Common Excavation	Cubic Yard
203(2)	Rock Excavation	Cubic Yard
203(3)	Unclassified Excavation	Cubic Yard
203(4)	Muck Excavation	Cubic Yard
203(5)	Borrow, Type _____	Cubic Yard
203(6)	Obliteration of Roadway	Station
203(7)	Select Gravel	Cubic Yard

When more than one type of Borrow is required, the different types shall be identified by adding a numeral suffix.

When no pay item is shown in the bid schedule, for “Stripping Material Sources”, all overburden and other waste material required to be removed from such Material Sources will be considered incidental to other pay items of work.

Water for compaction will not be paid for directly but will be considered incidental to other items.

The placing and removing of temporary surcharge material as well as the work required to continually advance the heading on a rolling surcharge, will not be paid for directly but will be considered incidental to other items.

END OF SECTION

SECTION 204

RESERVED

SECTION 205 STRUCTURE EXCAVATION FOR CONDUITS AND MINOR STRUCTURES

205—1.00 GENERAL

205—1.01 DESCRIPTION

A. Work Included:

This work shall consist of the excavation and backfill or disposal of all materials required for the construction of water systems, sewer systems, steam systems, box culverts, pipe culverts, storm drains, manholes, inlets, catch basins, and other minor structures in accordance with these specifications and in reasonably close conformity with the lines, grades, and typical cross sections shown on the plans. Ditches at inlets and outlets of culverts and any other ditches indicated in the plans shall be constructed under Section 203.

Unless otherwise specified structure excavation shall include all pumping, bailing, draining, dewatering, sheeting, bracing, and incidentals required for proper execution of the work.

Excavation of frozen material encountered shall be considered incidental to structure excavation and shall not be the basis for a claim for extra work.

Additional structure excavation and backfill with select gravel is for any additional excavation below planned structure excavation limits with associated backfill with specified aggregate authorized by the Owner's representative on site due to unforeseen soil conditions. Backfill under this bid item shall be with Select Gravel. No work shall proceed under this bid item without the written order of the Engineer.

B. Related Work Described Elsewhere:

1. Section 115: Traffic Maintenance.
2. Section 208: Dewatering Excavations.
3. Section 603: Culverts and Storm Drains.
4. Section 604: Manholes, Inlets, and Catch Basins.
5. Section 626: Sanitary Sewer System.
6. Section 628: Water System.
7. Section 632: Steam System.
8. Section 661: Electric and lighting.

C. Work Installed but Furnished under other directives:

Not Used

D. Work Furnished But Not Installed:

Not Used

205—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used

B. Qualifications of Installers:

Not Used

C. Codes and Standards:

- | | | |
|----|--|-----------------|
| 1. | Alaska T-3, T-11
AASHTO T205, T238
Method A or C | Field Density |
| 2. | AASHTO T180-D
Alaska T-12 | Optimum Density |
| 3. | Alaska T-7 | Sieve Analysis |

D. Source Quality Control:

Not Used

205-1.03 SUBMITTALS

Not Used

205-1.04 PRODUCT/MATERIAL HANDLING

Select Gravel for bedding shall be placed such that it will not be mixed with deleterious material during installation.

205—2.00 PRODUCTS

205—2.01 MATERIALS STANDARDS

A. General:

Materials shall conform to the standards listed in these specifications.

B. Backfill:

Backfill shall consist of approved materials from Structure Excavation. Any additional materials shall conform to Section 703-2.13.

205—3.00 EXECUTION

205—3.01 CONDITIONS

A. Inspection:

Prior to all the work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

205—3.02 INSTALLATION

A. Construction Methods:

Unsuitable foundation material shall be removed as directed and shall be replaced with approved material.

Where rock or other unyielding material is encountered, it shall be removed for the specific depth as shown on the plans or as directed and shall be replaced with approved material.

All backfill, excluding pipe bedding which shall conform to Section 205—3.02(B), shall be placed in uniform loose layers of not more than six inches in depth and compacted to a density of not less than ninety—five percent (95%) of the optimum density as determined by AASHTO T180, Method D, or Alaska T—12. In place field densities will be determined by Alaska T—3, Alaska T—11, AASHTO T205 or AASHTO T238, Method A or C. Ponding or jetting of backfill shall not be permitted. All backfill placed over and around buried structures shall be manually compacted in six inch layers to ninety—five percent (95%) optimum density until one foot of cover exists over the structure. With the Engineers approval, mechanical equipment may be used in compaction of subsequent six inch layers.

To achieve soil compaction below pipes near catch basins, manholes or other structures, the Contractor shall place the structure on its prepared base, then backfill around the structure up to pipe grade in accordance with this Section. Only when this is performed to the satisfaction of the Engineer, may the Contractor install the pipe section.

The Contractor shall not start any excavation until he/she has on hand all materials and equipment necessary for rapid completion of the work.

The bottom of excavation shall be kept free of standing water. The Contractor shall provide all necessary equipment to keep the excavation dewatered.

Backfill shall not be placed against fresh grout. Backfill will only be allowed after a twenty—four (24) hour curing period.

At no time will the Contractor have more than one thousand feet of trench open, nor more than two (2) intersections closed to vehicular traffic, except with specific written permission of the Engineer. Pedestrian access crossings suitably equipped with hand rails shall be provided as directed by the Engineer. The cost of such crossings, if required, shall be incidental to the Traffic Maintenance bid item. See also the Traffic Control Plan, Appendix, and the plans for additional requirements or exceptions.

Pavement and sidewalk removal required during execution of this work shall be considered incidental to structure excavation and backfill.

No backfill shall be placed against newly constructed masonry or concrete structures for a period of fourteen (14) calendar days, unless authorized.

When existing conduits or utilities, which are not scheduled for removal or abandonment, are encountered in the excavation, they shall be adequately supported and protected from damage.

Unless otherwise indicated in the plans, all sheeting and bracing used in making structure excavation shall be removed by the Contractor following the completion of the work.

B. Bedding:

All pipe shall be bedded as specified on the plans and in accordance with the Standard Detail. If the native material is acceptable, it shall be compacted to ninety—five percent (95%) of optimum density at the grade shown on the plan before placing the pipe. If the native material is found unacceptable, the Contractor shall remove a minimum of twelve inches of this material and replace it with 2 six inch lifts of acceptable material each compacted to ninety—five percent (95%) of optimum density.

Backfill around the pipe shall conform to the Standard Details. The first lift may be to the pipe springline; additional lifts may not exceed six inches in depth. All such material shall be compacted to a density of not less than ninety—five percent (95%) of maximum density.

Maximum densities shall be determined by AASHTO T—180D or Alaska T—12; in place field densities will be determined by Alaska T—3, Alaska T—11, AASHTO T—205, or AASHTO T—238, method A or C. Ponding or jetting of backfill shall not be permitted.

Bedding beneath all other structures shall be as specified in the plans and details.

205-4.00	MEASUREMENT AND PAYMENT
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205—4.01 GENERAL

Payment will not be made for structure excavation and backfill until the material is compacted in place.

205—4.02 MEASUREMENT

The quantity of structural excavation to be paid for under this item will be the number of cubic yards, measured in its original position, of the material acceptably excavated in conformity with the plans or as directed by the Engineer.

For masonry culverts, headwall, and drainage structures other than conduit, vertical planes eighteen inches outside the base of the masonry sections shown on the plans for the depth required will be used for measuring.

In construction of culverts, storm drains, under drains, and structural plate pipe and pipe arches, the limits for measuring structure excavation will be as follows:

For conduits, measurement will be between parallel vertical planes located eighteen inches outside the horizontal projection, except when the ends are embedded in manholes, headwalls, or inlets, then, the longitudinal horizontal limit will be eighteen inches outside the base of the end structure.

Any additional excavation to provide for shoring, sheet piles, excavation shields or flattening the excavation slopes, will not be measured for payment but shall be considered incidental to other items of work under this Section.

Structure excavation will only be measured below the limits of other classes of excavation. When structures are to be placed in embankment sections, the natural ground line as cross-sectioned will be the uppermost level of computation unless otherwise indicated on the plans or in the Special Provisions.

Additional structure excavation and backfill shall be measured using the same horizontal limits as for structure excavation and using vertical limits as specified in the order authorizing work under this bid item.

Bedding materials select gravel shall be measured using the same horizontal limits as for structure excavation and using vertical limits as specified in the Standard Details. The quantity will not include the volume of the structure.

The measurement method used for structure excavation and backfill, and bedding material select gravel shall be the "Contract Quantity Payment". The Contractor should verify the estimated quantities prior to bid. Payment shall be made for the Contract quantity unless charges to the work are authorized in writing by the Engineer or the Contractor fails to excavate to the excavation limit as shown on the plans.

205—4.03 PAYMENT

The accepted quantities of structure excavation will be paid for at the contract unit price per cubic yard. The unit price per cubic yard shall include the placing and compacting of all backfill and bedding when the materials used are obtained from structure excavation, any clearing and grubbing required and not paid for under some other item, formation of any embankments made with surplus material from structure excavation, and disposal of all surplus or unsuitable excavation, unless otherwise specified.

Excavation below planned structure excavation limits with associated backfill with material conforming to the requirements for select gravel shall be paid at the Contract unit price per cubic yard for the accepted quantities of additional structure excavation and backfill with select gravel.

The unit price shall include the excavation, any required dewatering (if nothing is called out on the Bid Schedule under Section 208), shoring, disposal of the unsuitable material, supply and placement of the required backfill material.

Any backfill material or bedding material required whose source is other than structure excavation will be paid for at contract unit price for the material being used, or as extra work if no unit price has been established.

Water required for compaction shall be considered incidental to the bid item.

Payment will be made under:

<u>Pay Item Number</u>	<u>Pay Item</u>	<u>Pay Unit</u>
205(1)	Structure Excavation and Backfill	Cubic Yards
205(2)	Additional Structure Excavation and Backfill with Select Gravel	Cubic Yards
205(3)	Bedding Material Select Gravel	Cubic Yards

END OF SECTION

D. Source Quality Control:

Foundation fill shall be removed from the stockpile such that it is not contaminated by deleterious material.

206—1.03 SUBMITTALS

Fourteen (14) days prior to the incorporation of fill materials in the work, the contractor shall notify the Engineer in writing of the proposed source of fill materials. The Engineer shall then notify the Contractor of the materials acceptability.

206—1.04 PRODUCT/MATERIAL HANDLING

Foundation fill shall be placed such that it is not contaminated by deleterious material.

206—2.00 PRODUCTS

206—2.01 MATERIALS STANDARDS

General:

Foundation fill shall consist of granular materials conforming to Section 703—2.13, Select Gravel. Backfill shall consist of materials from structure excavation when approved as suitable and both approved and any additional materials needed shall conform to the requirements of Section 703—2.10.

206—3.00 EXECUTION

206—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

206—3.02 INSTALLATION

A. Excavation:

All necessary clearing and grubbing operations shall be completed prior to commencing excavation.

All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface, either level, stepped or serrated as directed.

When swell or subsidence results from driving piles, the Contractor shall excavate or backfill with foundation fill material, the footing area to the grade of the bottom of the footing, as shown on the plans. This work shall be considered incidental.

The Engineer may order, in writing, changes to the elevations of the bottom of footings as shown on the plans when necessary to obtain satisfactory foundations. Unless otherwise directed, material below the elevation of the bottom of footings shall not be disturbed.

All excavated material shall be utilized for backfill or embankment when approved as suitable and any unsuitable or surplus excavated material shall be disposed of as directed.

Streambed channels shall not be altered and excavated materials shall not be placed in natural stream channels, unless shown on the plans or approved in writing.

Upon the completion of the excavation, the bedding for foundation shall be approved prior to the placement of any form work or foundation materials.

Foundations on Bedrock. Excavation for footings founded on bedrock shall be made to the neat lines of the footings unless otherwise shown on the plans or directed. Overbreak outside the neat lines of footings shall be filled with Class A concrete. No compensation shall be made for the concrete required to fill the overbreak.

Cofferdams. Suitable cofferdams shall be used as necessary wherever water—bearing strata are encountered above the elevation of the excavation. Foundation seals shall conform to the requirements of Section 501.

The Contractor shall submit drawings showing proposed method of cofferdam construction and the details thereof. The details and clearance of cofferdams, insofar as such details affect the character of the finished work, will be subject to approval but other details of the design will be left to the Contractor who will be responsible for the successful construction of the work. The drawings shall be submitted at least three (3) weeks in advance of the time the Contractor begins construction of the cofferdams, unless otherwise permitted.

Cofferdams shall be carried well below the bottom of the footing or to bedrock and shall be well braced and as watertight as practical. The interior dimensions of the cofferdams shall provide sufficient clearance to permit construction of forms and permit pumping outside of the forms.

Cofferdams which are tilted or moved out of position by any cause during the process of sinking shall be righted or enlarged so as to provide the necessary clearance and proper pier location and such work shall be at the Contractor's expense.

When no foundation seal is shown on the plans and the cofferdam cannot be dewatered, a seal shall be placed if permitted in writing.

Foundation seals, when shown on the plans, may be eliminated as directed if the cofferdams can be dewatered without the seals when the excavation has been carried to the elevation of

the bottom of the footing, unless the plans or special provisions specifically note that seals shall not be eliminated.

Cofferdams shall be vented at low water, if foundation seals are required, in order to prevent damage to green concrete from differential hydrostatic head.

No timber shall be used in such a manner as to extend into the completed substructure.

After completion of the substructure, sheet piling and other temporary structural materials shall be removed in such a manner as to avoid disturbing the finished structure. Steel or concrete sheeting or bracing may be permitted to remain in the completed structure, subject to approval.

B. Foundation Fill:

Material below the elevation of the bottom of the footing which is unsuitable for foundations shall be removed as shown on the plans or as directed in writing. The material shall be replaced with foundation fill placed in six inch layers and compacted to ninety—five percent (95%) compaction when tested in accordance with the Alaska T—3 or T—11 or AASHTO T—205 or AASHTO T—238, Method A or C. Maximum density will be determined by with AASHTO T 180 Method D, or Alaska T—12.

C. Backfill:

Backfill materials shall be placed in horizontal eight inch layers and compacted as required for foundation fill unless otherwise provided. Each layer shall be moistened, or dried, as necessary to obtain the compaction. Backfill shall be placed as uniformly as possible on all sides of structural units, and when placed against green concrete or retaining type walls, care shall be exercised to prevent pressures which would damage the structure. Slopes within the area to be filled shall be benched or serrated to prevent wedge action.

Ponding or jetting of backfill will not be permitted, unless approved in writing.

Backfill placed underwater in natural stream channels will not require compaction or placement in thin layers. Unbalanced loads, due to backfill, which would damage the structure, shall not be permitted.

Where weep—holes are shown on the plans or required by the specifications, not less than one (1) cubic foot of filter material securely tied in a burlap bag shall be placed in the backfill at each hole. The bag of filter material shall extend at least 0.5 feet above the hole.

206-4.00	MEASUREMENT AND PAYMENT
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206—4.01 GENERAL

A. Payment for excavation will not be made until the material is removed and properly disposed of. Payment for fill material will not be made until the material is compacted in place.

206-4.02 MEASUREMENT

A. Excavation. The limits of the excavation quantities to be measured shall be the actual yardage of material removed but in no case shall any of the following yardage be included

in the measurement for payment

1. The yardage of any material removed prior to measurement of the original ground surface after clearing and grubbing is completed.
 2. The yardage outside of the vertical planes eighteen inches outside of and parallel to the neat lines of the footings, except that the limit shall be vertical planes coincident with the neat lines of the seals when seals are shown on the plans.
 3. The yardage outside of vertical planes coincident with the neat lines of footings excavated in solid rock unless otherwise shown on the plans or directed by the Engineer.
 4. The yardage of embankment material placed above the elevation of the bottom of footings, except for materials placed under previous contracts.
 5. The yardage within the staked limits of other types of excavation for which payment is otherwise provided in the contract.
- B. Backfill. Backfill material, obtained from within the limits of structure excavation, shall not be measured for payment.
- C. Foundation Fill. The quantities of foundation fill to be measured for payment shall be the actual number of cubic yards of material accepted in final position.
- D. Filter Material. The quantities of filter material to be measured for payment shall be the number of cubic yards accepted in final position as determined from the minimum dimensions shown on the plans.
- E. Cofferdams are a lump sum item and no measurement of quantities will be made.

206—4.03 PAYMENT

Payment for the quantities determined as provided above shall be made at the contract unit price or lump sum price for each of the pay items listed below that is shown on the bid schedule.

Any backfill material from sources other than structure excavation will be paid for at the contract unit price for the material being used, or as extra work if no unit price has been established.

Excavation for footings ordered by the Engineer, at a depth greater than three feet below the bottom elevation for such footings shown on the plans shall be paid for as extra work in accordance with Section 108.

Where a bid item for cofferdams appears in the Bid Schedule and the Contractor successfully completes the excavation and construction by means of approved alternate methods, the full contract price for cofferdams will be paid to the Contractor. Where a bid item for cofferdams does not appear in the Bid Schedule, the work necessary to protect the excavation and control water will not be paid for directly, but will be considered incidental to other items of work.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
206(1)	Excavation for Structures	Cubic Yard
206(2)	Cofferdams	Lump Sum
206(3)	Foundation Fill	Cubic Yard
206(4)	Filter Materials	Cubic Yard

The horizontal pay limits for Section 206 are based on the minimum clearances around the structure required to adequately perform the required work. Any additional excavation to provide for shoring, sheet piles, excavation shields or flattening of the excavation slopes, will not be measured for payment and will be considered incidental to items of work under this Section.

END OF SECTION

SECTION 207 FILTER BLANKETS AND FILTER CLOTH

207—1.00 GENERAL

207—1.01 DESCRIPTION

A. Work Included:

Filter Blankets shall consist of construction of a layer of specified material in reasonably close conformance to the plan dimensions and elevations.

Filter Cloth shall consist of the application of a woven or non—woven layer of filter cloth material in reasonably close conformance to the plan dimensions and elevations.

B. Related Work Described Elsewhere:

Not Used.

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

207—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used.

C. Codes and Standards:

Not Used.

D. Source Quality Control:

Not Used.

207—1.03 SUBMITTALS

Not Used.

207—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

207—2.00 PRODUCTS

207-2.01 MATERIALS STANDARDS

A. General:

Filter Blanket. Filter blanket material shall conform to the requirements of Section 703—2.08.

Filter Cloth. Filter cloth material shall conform to the requirements of Section 729.

207—3.00 EXECUTION

207—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

207-3.02 INSTALLATION

A. Construction Requirements:

Filter blankets shall be constructed in an even, homogeneous layer and placed in such a manner to avoid contamination by the underlying material. The layer may be placed full thickness in one (1) application, by end—dumping and spreading by tracked equipment.

Filter cloth shall be applied over a prepared surface or undisturbed ground as shown on the plans. Roots, stones or any other protruding objects which may puncture the filter cloth shall be removed or cut flush with the surface. End and longitudinal joint overlapping widths shall be as shown on the plans. Embankment material shall be end—dumped and spread to a minimum depth of twelve inches over the filter cloth, before allowing normal embankment and compaction work to commence.

207-4.00 MEASUREMENT AND PAYMENT

207—4.01 GENERAL

Not Used.

207-4.02 MEASUREMENT

- A. Filter blanket material may be measured by volume in final position, or by weight.
- B. Filter cloth material shall be measured along the surface of the ground as staked. No allowance shall be made for joint overlaps.

207—4.03 PAYMENT

- A. The accepted quantity of filter blanket material shall be paid for at the contract unit price for the specified pay unit. The contract price per unit shall be full compensation for furnishing all materials, equipment and labor for excavating, processing, hauling, spreading and leveling of the filter blanket layer.
- B. The accepted quantity of filter cloth shall be paid for at the contract unit price per square yard, installed in place. The contract unit price per square yard shall be full compensation for furnishing all materials, equipment and labor for surface preparation, installation, and pinning or staking, if required.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
207(1)	Filter Blanket	Cubic Yard
207(2)	Filter Blanket	Ton
207(3)	Filter Cloth	Square Yard

END OF SECTION

SECTION 208 DEWATERING EXCAVATIONS

208—1.00 GENERAL

208—1.01 DESCRIPTION

A. Work Included:

Consists of furnishing all materials, labor, equipment and supervision to design, install, operate, and remove dewatering systems, and to lower the water table sufficient to prevent ground water from entering excavations. The work also includes, but is not necessarily limited to, the proper disposal of water removed by the dewatering system.

B. Related Work Described Elsewhere:

1. Section 205 Structure Excavation for Conduits and Minor Structures.
2. Section 206 Excavation, Backfill, and Foundation Fill for Structures.

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

208—1.02 QUALITY ASSURANCE

Not Used.

208—1.03 SUBMITTALS AND PERMITS

- A. Acquire Alaska Department of Environmental Conservation permit for disposal of water if required.
- B. Seven days prior to the preconstruction conference, the Contractor shall submit the dewatering plan showing well locations and types, piping location, discharge point, drainage channels utilized, and discharge quantities.

208—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

208-2.00 MATERIALS

Not Used.

208—3.00 EXECUTION

208—3.01 CONDITIONS

A. Inspection:

Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work under this section may be installed in accordance with all pertinent codes and regulations, the original design, and referenced standards.

Verify that there are no conflicts with existing utilities prior to starting work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

208—3.02 EXECUTION

A. General:

1. The excavation shall be kept free from standing water twenty—four (24) hours per day.
2. When the dewatering Bid Item is called for in the bid schedule under this section, the use of a sump within the excavation is not allowed to control ground water.

The means of dewatering shall be by well points, cased wells, or other means that will intercept and remove the ground water such that it is prevented from entering the excavation.

3. The Contractor shall dispose of dewatering discharge water only at the disposal locations shown on the plans. If no such disposal locations are specified, the Contractor shall dispose of discharge water in a location, manner, and of a quality consistent with all applicable laws, regulations, and standards. The Contractor shall not charge any drainage structures beyond 50 percent of their maximum capacity.
4. The Contractor shall remove all dewatering equipment and materials at the completion of the work or as otherwise directed by the Engineer.
5. The dewatering system shall be kept in operation until all work in the excavation is backfilled and properly compacted to a point three feet above the existing water table elevation.
6. The Contractor shall arrange for, and provide all necessary utilities to operate the dewatering system.

B. Excavations for Large Structures:

1. Dewatering for a large structure shall operate such that the water table will be lowered to an elevation a minimum of two feet below the bottom of the total area of the excavation plus a minimum of ten feet beyond the outside of the excavation limits at the bottom of the excavation.

C. Trench Excavations:

1. Dewatering for trench excavations shall operate such that the water table is lowered to an elevation of a minimum of two feet below the bottom of the excavation.
2. A minimum of four days and no more than seven days prior to trench excavation in areas requiring dewatering, the Contractor shall determine the elevations of the water table at five hundred feet intervals. The method used shall be at the Contractor's option.

208—4.00 MEASUREMENT and PAYMENTS

208—4.01 Not Used.

208-4.02 MEASUREMENT

A. Dewatering for large structures:

Dewatering for excavations for large structures shall be measured on a lump—sum basis for all dewatering required.

Payment for dewatering for excavations for large structures shall be on a lump sum basis, including all design materials, labor, equipment, ditching, disposal of water and supervision required.

B. Trench Excavations:

Dewatering for trench excavations shall be measured on the basis of the overall horizontal trench dewatered in one hundred feet sections parallel to the trench, as called out in the plans or directed in the field.

Payment for dewatering for trench excavations shall be on a one hundred feet sections basis including all design, materials, labor, equipment, supervision, ditching, and disposal of water required for dewatering.

In dewatering of trench excavations is not a contract quantity, the quantity of dewatering will be a field authorized and measured item.

208—4.03 BASIS OF PAYMENT

208(1)	Dewatering Excavations for Large Structures	Lump Sum
208(2)	Dewatering Trench Excavations	Per 100 Feet

END OF SECTION

SECTION 209 - 299

RESERVED

DIVISION 300

BASES

SECTION 301 AGGREGATE BASE COURSE

301—1.00 GENERAL

301—1.01 DESCRIPTION

A. Work Included:

This work shall consist of furnishing and placing one or more courses of aggregate and additives if required, on a prepared surface in conformance with the plans.

B. Related Work Described Elsewhere:

1. Not Used

C. Work Installed But Furnished under other directives:

1. Not Used

D. Work Furnished But Not Installed:

1. Not Used

301—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers.

1. Not Used

B. Qualifications of Installers.

1. Not Used

C. Codes and Standards:

- | | | |
|----|--|----------------------------|
| 1. | Alaska T-3, T-11
AASHTO T205, T238
Method A or C | Field Density |
| 2. | AASHTO T180-D
Alaska T-12 | Optimum Density |
| 3. | Alaska T-7
Alaska T-4 | Sieve Analysis
Fracture |

D. Source Quality Control:

The Contractor shall provide to the Engineer the source of the aggregate base course two weeks prior to its proposed incorporation into the work. The Engineer will test the material and notify the Contractor of its acceptability.

301—1.03 SUBMITTALS

- A. Not Used

301—1.04 PRODUCT/MATERIAL HANDLING

- A. The aggregate base course shall be placed such that it will not be mixed with select gravel or deleterious material during installation.

3.01—2.00 PRODUCTS

301—2.01 MATERIALS STANDARDS

- A. General

Materials shall conform to the standards listed in these specifications.

- B. Aggregates

The aggregates shall conform to the requirements of Section 703—2.03. The gradation of base course material will be selected from Table 703—2, at the Contractor's option. Only one gradation of material shall be used on a project, unless otherwise specified.

When the stationary plant method is used, the aggregate will be accepted immediately following mixing based on periodic samples taken from the pug mill output. When a road mix method is used, the aggregate will be accepted after necessary blending and before laydown based on samples taken from the combined windrow for each lift.

CONSTRUCTION REQUIREMENTS

301—3.00 EXECUTION

301—3.01 CONDITIONS

- A. Inspection:

Prior to all the work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

- B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing. Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

301—3.02 INSTALLATION

- A. Placing:

The maximum compacted thickness of any one layer shall not exceed six inches, unless special compacting equipment is utilized. When vibratory or other approved types of special compacting equipment are used, the compacted depth of a single layer of the base course may be increased to eight inches upon written approval.

During placement of the base material on the roadway, the roadway surface shall be adequately drained at all times.

B. Mixing

Unless otherwise specified, the Contractor shall mix the base course by any one of the three following methods and if required, add the additive shown on the plans.

1. Stationary Plant Method. The base course material and water shall be mixed in an approved mixer. Water shall be added for compaction during the mixing operation in an amount necessary to provide a moisture content approximately equal to optimum moisture. After mixing, the base material shall be placed in an approved aggregate spreader and spread on the roadbed.
2. Travel Plant Method. After the material for each layer of base course has been placed through an aggregate spreader or windrow sizing device, the base shall be uniformly mixed by a traveling mixing plant. During the mixing, water shall be added for compaction in an amount sufficient to provide a moisture content approximately equal to optimum moisture.
3. Road Mix Method. After material for each layer of base course has been placed, the materials shall be mixed at a moisture content approximately equal to optimum by means of motor graders and other approved equipment until the mixture is uniform throughout.

C. Shaping and Compaction:

Compaction of each layer shall continue until a density of not less than 98 percent of the maximum density, determined in accordance with AASHTO T180, Method D, or Alaska T—12 has been achieved. Field densities shall be determined by Alaska T—3, Alaska T—11, AASHTO T205 or AASHTO T238, Method A or C. The surface of each layer shall be maintained during the compaction operations in such a manner that a uniform texture is produced and the aggregates firmly keyed. Water shall be uniformly applied over the base materials during compaction in the amount necessary for proper compaction.

Compaction tests shall be taken at locations designated by the Engineer. Unless otherwise directed by the Engineer, the Contractor shall notify the Engineer at least two (2) hours in advance of when he/she desires the required tests to be conducted.

The surface will be tested using a ten foot straight—edge at selected locations. The variance of the surface from the testing edge of the straight—edge between two contacts with the surface shall not exceed three—eighths inch.

301-4.00	MEASUREMENT AND PAYMENT
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301—4.01 GENERAL

Payment for crushed aggregate base course will not be made until the material is compacted in place and accepted for placement of asphalt.

301—4.02 MEASUREMENT

The measurement method used for aggregate base course shall be the “Contract Quantity Payment”. The Contractor should verify the estimated quantities prior to bid. Payment shall be made for the Contract quantity unless changes to the work are authorized in writing by the Engineer.

Water required for compaction, and added to the base material on the grade, will be considered incidental to the bid item.

301—4.03 PAYMENT

The accepted quantity of crushed aggregate base course will be paid for at the contract price per unit of measurement, complete and in place.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
301(1)	Crushed Aggregate Base Course	Ton
301(2)	Crushed Aggregate Base Course	Cubic Yard

END OF SECTION

SECTION 302 - 303

RESERVED

SECTION 304 SUBBASE

304—1.00 GENERAL

304—1.01 DESCRIPTION

A. Work Included:

This work shall consist of furnishing, placing and compacting subbase material in embankments or in other locations shown on the plans, and in reasonably close conformance with the plans.

B. Related Work Described Elsewhere:

Section 203	Excavation and Embankments
Section 302	Aggregate Base

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but No Installed:

Not Used.

304—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used.

C. Codes and Standards:

- | | | |
|----|---|-----------------|
| 1. | AASHTO T180 Method D
Alaska T-12 | Optimum Density |
| 2. | Alaska T-3 or T-11
AASHTO T205, T238 | Field Density |
| 3. | Alaska T-7 | Sieve Analysis |

D. Source Quality Control:

Not Used.

304—1.03 SUBMITTALS

Not Used.

304—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

304—2.00 PRODUCTS

304—201 MATERIALS STANDARDS

A. General:

Subbase shall meet the requirements of Section 703—2.13, Select Gravel, for the grading type shown on the plans.

Materials shall be accepted as specified in Section 301—2.01.

304—3.00 EXECUTION

304—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

304—3.02 INSTALLATION

A. General

The placement of subbase material shall conform to the requirements of Section 203—3.02 of Section 203. Excavation and Embankments, except as hereinafter specified.

When subbase materials is utilized as the finished wearing course, placement in the roadway shall conform to the requirements of Section 301—3.02. After each layer of subbase material has been placed, the materials shall be uniformly mixed while at a moisture content approximately equal to the optimum moisture content, by means of a motor grader or other approved equipment, until the mixture is uniform throughout. Compaction of each layer shall continue until a density of not less than 95 percent of the maximum density, determined in accordance with AASHTO T 180, Method D, or Alaska T—12 has been achieved. Field densities shall be determined by Alaska T—3 or T—11.

304—4.00 MEASUREMENT AND PAYMENT

GENERAL

Not Used

304-4.02 MEASUREMENT

Subbase will be measured by the cubic yard measured in final position. Water needed for compaction and added to the subbase material in the grade, will be considered as an incidental part of this item.

The accepted quantities of subbase of the size, type, and grading specified shall be paid for at the contract unit prices per ton or cubic yard complete in—place.

304-4.03 PAYMENT

Payment will be made under:

Pay Item No.	Pay Item	Pay Unit
304(1)	Subbase, Grading	Ton
304(2)	Subbase, Grading	Cubic Yard
304(3)	Subbase, Grading	Cubic Yard
		Veh.Meas.

END OF SECTION

SECTIONS 305 - 399

RESERVED

DIVISION 400

ASPHALT

SECTION 401 ASPHALT CONCRETE PAVEMENT

401—1.00 GENERAL

401—1.01 DESCRIPTION

A. Work Included:

This work consists of the furnishing and mixing of aggregate and asphalt at a central mixing plant or the acquisition of a prepared mixture from an approved commercial source, and the hauling, spreading, and compaction of the mixture, all as specified in the contract and in reasonably close conformance with the lines, grades, and thicknesses shown on the plans.

B. Related Work Described Elsewhere:

1. Not Used

C. Work Installed But Furnished Under Other Directives:

1. Not Used

D. Work Furnished But Not Installed:

1. Not Used

401—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

1. Not Used

B. Qualifications of Installers:

1. Not Used

C. Codes and standards.

1. Not Used

D. Source Quality Control:

- | | | |
|----|-------------|---|
| 1. | AASHTO D166 | Specific Gravity of Bituminous Mixtures |
| | Alaska T—16 | Bitumen Content of Paving Mixtures |
| | Alaska T—7 | Sieve Analysis |
| | Alaska T—14 | Coating and Stripping of Bitumen Aggregate Mixtures |

401—1.03 SUBMITTALS

A. Mix Design:

If the mixture is obtained from a commercial source, the Contractor shall submit a certified statement of its components and their proportions as outlined in these specifications for approval as the Job Mix Design.

In this Contract, the hot asphalt pavement aggregate shall meet the gradation requirements for asphalt concrete Type I aggregate. The asphalt cement shall be AC—5—6.0% by weight of dry aggregate. The Contractor shall provide a certified copy of the “Marshall Mix Design Test” for the proposed pavement for approval of the Engineer two weeks prior to the start of paving operations.

401-1.04 PRODUCT/MATERIAL HANDLING

A. Protection:

1. The Contractor will cover the asphalt in the trucks when the temperature is below 50° and/or rain is imminent or falling.

B. Replacements:

1. Not Used

C. Compliance with Instructions:

1. The Contractor will place the mix in accordance with the recommendations of the Marshall Mix Design.

401—2.00 PRODUCTS

401—2.01 MATERIALS STANDARDS

A. General:

All mixes furnished for the project shall conform to the approved Job Mix Design within the ranges of tolerances shown below, and within the limits of Table 703—3, for the type specified.

Sieve Size or Item	Tolerance % Passing
3/4 inch	±8
3/8 inch	±7
No. 4	±7
No. 10	±6
No. 40	±4
- No. 200	±3
Asphalt %	±0.5

The acceptance of aggregates will be based upon representative samples taken at one or more of the following locations:

1. Individual hot bins.
2. Combined aggregates prior to adding asphalt.
3. Extracted aggregate.

B. Aggregates:

Aggregates shall conform to the requirements of Section 703—2.04. Class of aggregate shall be shown in the Bid Schedule.

C. Filler:

Filler shall conform to the requirements of Section 703—2.06.

D. Asphalt Materials:

The type and grade of asphalt material will be shown in the Bid Schedule.

The asphalt material shall conform to the applicable requirements of Section 702, Asphalt Materials. Asphalt materials will be conditionally accepted at the source.

401—3.00 EXECUTION

401—3.01 CONDITIONS

A. Inspection:

Prior to all the work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

401—3.02 INSTALLATION

A. General:

1. Not Used

B. Weather Limitations:

The asphalt mixture shall not be placed on a wet surface, or on an unstable roadbed, when the base material is frozen, or when weather conditions prevent the proper handling or finishing of the mixture. No asphalt mixture shall be placed unless the air temperature is above 40°F. as measured in the shade away from heat sources. Open grading asphalt mixtures shall not be placed unless the air temperature is over 60°F.

C. Stockpiling:

Aggregates that have become mixed with earth or foreign material, or become coated with undesirable material shall not be used.

D. Asphalt Plants:

Mixing plants shall be either the weight batching type, continuous flow mixing type, or dryer—drum type. All dryer—drum mixers shall have been specifically designed and constructed for the process.

1. Requirements for All Plants:

Mixing plants shall be of sufficient capacity and coordinated to adequately handle the proposed asphalt construction.

a. Non—commercial Plant Scales. (Scales used only for proportioning Materials.)

Scales shall be accurate to 0.5 percent of the maximum load that may be required. Poises shall be designed to be locked in any position to prevent unauthorized change in position. In lieu of plant and truck scales, the Contractor may provide an approved automatic printer system which will print the weights of the material delivered, provided the system is used in conjunction with an approved automatic batching and mixing control system. Such weights shall be evidenced by a weight ticket for each load.

Scales shall be inspected as often as deemed necessary to assure their continued accuracy. The Contractor shall have on hand not less than ten (10) fifty pound (50 lb.) weights for testing the scales.

b. Asphalt Storage:

Tanks for the storage of asphalt cement shall be equipped to heat and hold material at the required temperatures. The heating shall be accomplished by hot oil, steam coils, electricity or other approved means so that no flame shall be in contact with the tank or asphalt.

The tanks shall be accurately calibrated to fifty gallon intervals and maintained to this accuracy. They shall be made accessible for measuring the volume of asphalt at any time.

Asphalt lines leading to the asphalt weighing system or spray bar shall be full circulating or shall be regulated so that the temperature of the asphalt does not change more than 25°F. during the plant stoppage from the temperature maintained while the plant is in full operation. The discharge end of the asphalt circulation pipe shall be maintained below the surface of the asphalt in the storage tank at all times.

The Contractor shall provide a suitable sampling device in asphalt feed lines connecting the storage tanks to the asphalt weighing system or spray bar. The sampling device shall be placed in a safe location that is readily accessible and in an area free of dangerous obstructions.

c. Feeder for Dryer:

The plant shall be provided with accurate mechanical means for uniformly feeding the aggregate into the dryer so that uniform production and uniform temperature will be obtained.

d. Dryer: *

The plant shall include a dryer or dryers which continuously agitate the aggregate during the heating and drying process. For cold—type asphalt mix, equipment for mechanical cooling of the dried aggregate to the temperature prescribed for cold mixtures shall be provided and shall be capable of supplying prepared material for the mixer to operate at full capacity.

e. Screens: *

Plant screens shall be capable of screening all aggregates to the specified sizes and proportions and having capacities in excess of the full capacity of the mixer.

f. Bins: *

The plant shall include storage bins of sufficient capacity to supply the mixer when it is operating at full capacity. Bins shall be arranged to assure separate and adequate storage of appropriate fractions of the mineral aggregates. Separate dry storage shall be provided for filler or hydrated lime when used and the plant shall be equipped to feed such material into the mixer. Each bin shall be provided with overflow pipes, of such size and at such location as to prevent backing up of material into other compartments of bins. Each compartment shall be provided with an individual outlet gate, constructed so that when closed, there shall be no leakage. The gates shall cut off quickly and completely. Bins shall be so constructed that samples can be readily obtained. Bins shall be equipped with adequate tell—tale devices to indicate the position of the aggregates in the bins at the lower quarter points.

* Does not apply to “dryer—drum” mixing plants.

g. Asphalt Control Unit:

Satisfactory means, either by weighing or metering, shall be provided to obtain the proper amount of asphalt material in the mix within the tolerance specified. Means shall be provided for checking the quantity or rate of flow of asphalt material into the mixer.

h. Thermometric Equipment:

An armored thermometer of adequate temperature range shall be fixed in the asphalt feed line at a suitable location near the charging valve at the mixer unit.

The plant shall also be equipped with an electric pyrometer, or other approved thermometric instrument so placed at the discharge chute of the dryer (dryer—drum) as to record automatically, the temperature of the heated aggregates (asphalt mixture).

i. Dust Collector:

The plant shall be equipped with a dust collector constructed to waste or return uniformly to the hot elevator all or any part of the material collected as directed.

All asphalt plants shall comply with State Department of Environmental Conservation standards, or local standards, whichever are more stringent. Reference is made to Title 18 Chapter 50 of the Alaska Administration Code.

j. Truck Scales:

The asphalt mixture shall be weighed on approved scales furnished by the Contractor or on public scales at the Contractor's expense. Such scales shall be inspected and sealed at the Contractor's expense as often as deemed necessary to assure their accuracy.

k. Safety Requirement:

Adequate and safe stairways to the mixer platform and sampling points shall be provided and guarded ladders to other plant units shall be placed at all points where accessibility to plant operations is required. Accessibility to the top of truck bodies shall be provided by a platform or other suitable device to enable the Engineer to obtain sampling and mixture temperature data. A hoist or pulley system shall be provided to raise scale calibration equipment, sampling equipment and other similar equipment from the ground to the mixer platform and return. All gears, pulleys, chains, sprockets and other dangerous moving parts shall be thoroughly guarded and protected. Ample and unobstructed space shall be provided on the mixing platform. A clear and unobstructed passage shall be maintained at all times in and around the truck loading area. This area shall be kept free from drippings from the mixing platform.

2. Requirements for Batching Plants:

a. Weight box or hopper. The equipment shall include a means for accurately weighing each size of aggregate in a weigh box or hopper suspended on scales and of ample size to hold a full batch without hand raking or running over. The gate shall close tightly so that no material is allowed to leak into the mixer while a batch is being weighed.

b. Asphalt control:

The equipment used to measure the asphalt material, for proportioning the mixtures only, shall be accurate within a tolerance of 0.5 percent of the control setting. The asphalt material bucket shall be a non—tilting type with a loose sheet metal cover. The length of the discharge opening or spray bar shall be not less than 3/4 the length of the mixer and it shall discharge directly into the mixer. The asphalt material bucket, its discharge valve or valves and spray bar shall be adequately heated. Steam jackets, if used, shall be efficiently drained and all connections shall be so constructed that they will not interfere with the efficient operation of the asphalt scales. The capacity of the asphalt material bucket shall be at least fifteen percent (15%) in excess of the weight of asphalt material required in any batch. The plant shall have an adequately heated quick—acting, non—drip, charging valve located directly over the asphalt material bucket.

The indicator dial shall have a capacity of at least fifteen percent (15%) in excess of the quantity of asphalt material used in a batch. The controls shall be constructed so that they may be locked at any dial setting and will automatically reset to that reading after the addition of asphalt material to each batch. The dial shall be in full view of the mixer operator. The flow of asphalt material shall be automatically controlled so that it will begin when the dry mixing period is over. All of the asphalt material required for one batch shall be discharged in not more than fifteen (15) seconds after the flow has started. The size and spacing of the spray bar openings shall provide a uniform application of asphalt material the full length of the mixer. The section of the asphalt line between the charging valve and the spray bar shall be provided with a valve and outlet for checking the meter when a metering device is substituted for an asphalt material bucket.

c. Mixer:

The batch mixer shall be an approved type capable of producing a uniform mixture within the Job Mix tolerances. If not enclosed the mixer box shall be equipped with a dust hood to prevent loss of dust.

The clearance of blades from all fixed and moving parts shall not exceed one inch unless the maximum diameter of the aggregate in the mix exceeds one and one—quarter inches, in which case the clearance shall not exceed one and one—half inches, unless otherwise specified by the manufacturer.

d. Control of Mixing Time:

The mixer shall be equipped with an accurate time lock to control the operations of a complete mixing cycle. It shall lock the weigh box gate after the charging of the mixer until the closing of the mixer gate at the completion of the cycle. It shall lock the asphalt material throughout the dry mixing period and shall lock the mixer gate throughout the dry and wet mixing periods. The dry mixing period is defined as the interval of time between the opening of the weigh box gate and the start of introduction of asphalt material. The wet mixing period is the interval of time between the introduction of asphalt material and the opening of the mixer gate.

The control of the timing shall be flexible and capable of being set at intervals of five (5) seconds or less throughout a total cycle of up to three (3) minutes. A mechanical batch counter shall be installed as a part of the timing device and shall be so designed as to register only completely mixed batches.

The setting of time intervals shall be performed in the presence of the Engineer.

3. Requirements for Continuous Mixing Plants:

a. Aggregate proportioning:

The plant shall include means for accurately proportioning each size of aggregate.

b. Weight Calibration of Aggregate Feed:

The plant shall include a means for calibration of gate openings by weighing test samples.

c. Synchronization of Aggregate Feed and Asphalt Material Feed:

Satisfactory means shall be provided to afford positive interlocking control between the flow of aggregate from the bins and the flow of asphalt material from the meter or other proportioning device.

d. Mixer:

The plant shall include a continuous mixer of an approved type, adequately heated and capable of producing a uniform mixture within the Job Mix tolerances.

4. Requirements for Dryer Drum Mixing Plants:

a. Aggregate proportioning:

The plant shall provide positive weight control of the cold aggregate feed by use of a belt scale, or other appropriate device, which will automatically regulate the feed gate and permit instant correction of variations in load. The cold feed flow shall be automatically coupled with the asphalt flow to maintain the required proportions of each material.

b. Requirements for Cold Feed Control Equipment:

Cold feed control equipment must be furnished and used with dryer—drum mixing plants. This equipment shall consist of:

1. A mechanical feeder having separate bins for each individual aggregate to be blended into the mixture.
2. Separate and positive feed control that can be easily and accurately calibrated for each bin used. The feed shall be quick adjusting and shall maintain a constant and uniform flow of aggregate throughout the range of its calibration.
3. Provisions shall be included to adjust the asphalt— aggregate feed ratio to accommodate variations in stockpile moisture content.

c. The system shall be equipped with automatic burner controls and shall provide for temperature sensing of the asphalt mixture at discharge.

E. Hauling Equipment:

Trucks used for hauling asphalt mixtures shall have tight, clean, smooth metal beds which have been thinly coated with a minimum amount of paraffin oil, lime solution or other approved material to prevent the mixture from adhering to the beds. Oil or diesel fuel shall not be used. Each truck shall have a cover of canvas or other suitable material of such size as to protect the mixture from the weather, when necessary, so that the mixture will be delivered on the road at the specified temperature.

Dumping of material in a windrow and then placing the material in the asphalt paver with pick—up equipment will be permitted, if the asphalt paver is of such design that the material will fall into a hopper which has movable bottom conveyor(s) to feed the screed and the pickup equipment is constructed so that substantially all of the material deposited on the roadbed is picked up and deposited in the paving machine. Use of the pick—up equipment will be discontinued if its use produces segregation, excessive temperature loss or other laydown problems.

The temperature drop of the asphalt mixture, taken immediately behind the screed, shall not be more than 30°F. less than the temperature of the material in the hauling unit, taken immediately after loading from the plant or surge bin.

F. Asphalt Pavers:

Asphalt pavers shall be self—contained, power—propelled units, provided with an activated screed or strike—off assembly, heated if necessary, and capable of spreading and finishing courses of material in lane widths applicable to the specified typical section and thicknesses shown on the plans. Pavers shall be equipped with a paver control system which shall automatically control the laying of the mixture to specified transverse slope and specified longitudinal grade. The paver control system shall be automatically actuated by the use of a mobile string line, ski, or other approved grade follower. Such mobile string line or ski shall be a minimum of thirty feet in length, shall be attached to the roadway centerline side of the paver by a linkage system that does not in any way bind or prevent the mechanism from truly following the grade, and shall be a product manufactured by a company regularly engaged in the production of equipment for this specific automatic paver control system use. The length of the ski, mobile string line, or other device shall be adjusted to whatever practical maximum is necessary to produce the intended smooth—riding surface. The kind of grade follower used and the type of automatic paver control system used shall be compatible and shall be optional with the Contractor, subject to demonstrated ability thereof to provide complete pavement fully conforming to all specified requirements. Pavers used for shoulders and similar construction shall be capable of spreading and finishing courses of material in widths as shown on the plans. Paver extensions shall include auger, activated screed or strike—off assembly and provisions for heating.

The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed.

In order to conform as closely as possible with the specified depth of wearing course, variations in existing cross—slopes shall be controlled through the transverse adjusting mechanism on the paver.

The screed or strike—off assembly shall produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

When laying mixtures, the paver shall be operated at forward speeds consistent with plant production.

Pavers shall be kept in full operating condition and in good repair and adjustment at all times.

G. Roller:

Rollers shall be of the steel wheel and/or pneumatic tire type, self-propelled, in good condition, capable of reversing without backlash, and operated at speeds slow enough to avoid displacement of the asphaltic mixture. The number and weight of the rollers shall be sufficient to compact the mixture to the required density and surface smoothness while it is still in a workable condition and capable of maintaining the pace of the paving operation. The use of equipment which results in crushing of the aggregate will not be permitted. All rollers shall have suitable equipment for keeping rollers or tires clean and efficiently dispersing water to the contact surfaces to devices shall be maintained on pneumatic rollers for heat retention.

The Contractor will be required to furnish a minimum of one pneumatic—tired roller, and two 2—axle tandem steel wheel rollers (1—8 ton minimum weight and 1—10 ton minimum weight) for each asphalt paver, with a separate operator for each roller.

A vibratory roller may be used as the finish roller provided that it meets the requirements for a finish roller and it is operated with the vibrating unit turned off.

Two—axle tandem rollers shall not weigh less than eight (8) tons, nor more than fourteen (14) tons. Pneumatic tired rollers shall not weigh less than eight (8) tons, nor more than sixteen (16) tons.

Rollers used for initial breakdown rolling shall be equipped with rolling wheels having a diameter of forty inches or more.

Pneumatic—tired rollers shall be oscillating type having a width of not less than four feet and equipped with pneumatic tires of equal size and diameter, having satisfactory treads. The rear group of tires shall align behind and cover the spaces between the forward group of tires. Wobble—wheel rollers will not be permitted. Tires shall be inflated to ninety pounds per square inch, or such lower pressure as designated and maintained so that the air pressure will not vary more than five pounds per square inch from the designated pressure. Pneumatic—tired rollers shall be so constructed that the total weight of the roller can be varied to produce an operating weight per tire of not less than two thousand pounds. The total operating weight of the roller shall be varied as directed.

Vibratory rollers with separate controls for energy and propulsion and especially designed for asphaltic pavement compaction may be used in accordance with the limits stated in this Subsection. Vibratory rollers will not be allowed for compaction of new pavements unless all phases of construction have been compacted by vibratory means except that they may be used for compaction of overlays of existing pavements. Vibratory rollers are not to be used when it is determined that such usage may cause a decrease in stability of the pavement structure.

Poorly performing rollers may be rejected and replaced with suitable equipment or supplemented as may be necessary to accomplish the desired results.

H. Conditioning of Existing Surface:

When the surface of the existing pavement or old base is irregular, it shall be brought to uniform grade and cross section as directed.

If determined necessary, the existing surface shall be cleaned of loose deleterious material by means of sweeping with a power broom, supplemented by hand sweeping as required.

Contact surfaces of curbing, gutters, manholes, and other structures shall be coated with a thin, uniform coating of tack coat material prior to the asphalt mixture being placed against them.

I. Preparation of Asphalt:

The asphalt shall not be heated over 350°F. at the jobsite. A continuous supply of the asphalt shall be supplied to the mixer at a uniform temperature, within 25°F. of the temperature ordered.

J. Preparation of Aggregates:

The aggregate for the mixture shall be heated and dried to a temperature compatible with the mix requirements herein specified. Flames used for drying and heating shall be properly adjusted to avoid damage to the aggregate and to avoid soot on the aggregate.

Immediately after heating and drying, the aggregates shall be screened into two or more fractions as specified and conveyed into separate compartments ready for batching and mixing with asphalt material. (Not applicable to dryer drum mixing plants.)

K. Mixing:

The aggregate fractions shall be combined in the mixer in the amounts required to meet the Job Mix Design. The asphalt material shall be measured or gauged and introduced into the mixer in the amount specified by the Job Mix formula. Anti—stripping additive shall be furnished by the Contractor in proportions determined by Alaska T—14.

After the required amounts of aggregate and asphalt material have been introduced into the mixer, unless otherwise specified, the materials shall be mixed until a complete and uniform coating of the particles and a thorough distribution of the asphalt material throughout the aggregate is obtained. Wet mixing time shall be determined for each plant and for each type of aggregate used. The minimum percent of coated particles used to establish the mixing time interval shall be ninety—five percent (95%) using AASHTO T195. At least seventy percent (70%) of the aggregate shall remain coated when tested in accordance with Alaska T—14. Additional approved additives may be required to obtain the required resistance to stripping.

Dryer Drum Mixing. The temperature of the asphaltic mixture at discharge from the mixer shall range from 325°F. maximum to 250°F. minimum. In no case shall the maximum temperature exceed the temperature producing a Kinematic viscosity of 150 Centistokes.

All Hot Mix Asphalt Plants (excluding Dryer Drum). The temperature of the aggregate at the time of adding asphalt cement shall not be less than 250°F., nor more than 325°F. In no case shall the maximum temperature exceed the temperature producing a Kinematic viscosity of 150 Centistokes.

The asphalt material and aggregate shall be introduced into the mixer within the specified temperature range and shall be within 25°F. of each other.

L. Surge Bins:

Surge Bins may be used at the option of the Contractor, conforming to the following requirements:

1. The units shall be equipped with a material level indicator and audible alarm. Draw down to material below the top of the cone will not be permitted except when emptying the surge bin.
2. All the asphalt plant mixture material drawn from the surge bins shall conform to all of the requirements for mixtures as if loaded directly into hauling equipment from the mixing plant. Signs of excessive segregation, heat loss, changes from the design mix, change in the characteristics of reclaimed asphalt, lumpiness or stiffness of the mix will be considered cause for rejection.
3. The Engineer will determine the permissible storage time for surge bins. A maximum of two (2) hours of storage time without any withdrawal will be permitted.

M. Spreading and Finishing:

The mixture shall be laid upon an approved surface, spread and struck off to the grade and elevation established. Asphalt pavers shall be used to distribute the mixture either over the entire width or over such partial width as may be practicable.

When the new adjacent layer of asphalt concrete is to be used as a reference surface, a small metal shoe shall be used as a sensing device.

The longitudinal joint in one layer shall offset that in the layer immediately below by approximately six inches. However, the joint in the top layer shall be at lane lines. Where thermoplastic striping is required, the longitudinal joint(s) in the top layer shall be offset six inches from the centerline and/or lane lines.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the mixture shall be spread, raked, and luted by hand tools. For such areas the mixture shall be dumped, spread and screeded to give the required compacted thickness.

Asphalt pavement shall be spread and compacted in layers. The top layer shall not exceed a two and one-half inches compacted depth. The next lower layer shall not exceed a three inch compacted depth. A pavement of three inch depth shall be placed in two approximately equal layers.

Asphalt pavement will not be placed until four hours after the prime coat has been applied.

N. Compaction:

Immediately after the asphalt mixture has been spread, struck—off and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. Rolling shall commence as soon as the rolling does not cause undue displacement, cracking or shoving. Any displacement occurring as a result of the reversing of the direction of a roller, or from other causes, shall be corrected promptly by the use of rakes and addition of fresh mixture when required. Care shall be exercised in rolling not to displace the line and grade of the asphalt mixture. Rollers shall move at a slow but uniform speed with the drive roll or wheels nearest the paver.

Unless otherwise directed, rolling shall begin at the sides and proceed parallel with the road centerline, each overlapping one—half the roller width, gradually progressing to the crown of the road. When paving in echelon or abutting a previously placed lane, the longitudinal joint shall be rolled first to provide pinching the material in place. On super—elevated curves the rolling shall begin at the low side and progress to the high side of overlapping of trips parallel with the centerline.

If vibratory rollers are utilized, the vibrator shall be turned off when roller passes are made along joints of previously placed material.

Along forms, curbs, headers, walls, and other places not accessible to the rollers, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons or with mechanical tampers. On depressed areas a trench roller may be used or cleated compression strips may be used under the roller to transmit compression to the depressed area.

Any mixture that becomes loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced with fresh hot mixture, which shall be compacted to conform with the surrounding area. Any area showing an excess or deficiency of asphalt cement shall be removed and replaced.

Rollers or other vehicles shall not be parked or left standing on pavement that has not cooled sufficiently to prevent indentation by wheels.

Unless otherwise specified, compaction control of asphalt pavements shall be by conformance strip method.

Control by Conformance Strip:

1. Control Strips:

A control strip shall be constructed at the start of each course and repeated as ordered whenever, (a) there is a change in the mix composition, (b) there is a change in compaction equipment, (c) there is a substantial change in ambient temperature, (d) routine tests indicate changes from results found in previous qualifying control strips.

Each control strip shall be constructed with the approved Job Mix Design. The control strip shall remain in place as a section of the completed work provided it complies with requirements for gradations, asphalt content, adequacy of mixing and line and grade. It shall be removed and replaced at the Contractor's expense or accepted to remain in place in accordance with Section 401—4.02 and a new control strip constructed if it does not meet specification requirements. Paving operations may not proceed beyond the control strip until authorized.

Each control strip shall be one lane in width, three hundred feet in length and shall be of the depth specified for the pavement course concerned.

Initial or breakdown compaction of a layer of asphaltic mixture shall be performed with a two—axle tandem roller except that pneumatic or vibratory compacting equipment may be used for the initial or breakdown compaction if it has been approved and if it is operated according to the procedures designated in the approval. Such approval will contain the minimum number of coverages required for the specific construction equipment determined from the control strip.

A pass shall be one movement of a roller in either direction. A coverage shall be as many passes as are necessary to cover the entire width being paved. Overlap between passes during any coverage, made to insure compaction without displacement of material in accordance with good rolling practice, shall be considered to be a part of the coverage being made and not part of a subsequent coverage. Each coverage shall be completed before subsequent coverages are started.

Except when approved pneumatic or vibratory rollers are used for initial compaction, the initial or breakdown compaction shall be followed immediately by intermediate rolling with a pneumatic—tired roller. Coverages with a pneumatic—tired roller shall start when the temperature of the mixture is as high as practicable, and shall be completed while the temperature of the mixture is at or above 150°F. Additional compaction with pneumatic—tired rollers will not be required when approved vibratory rollers are used for the initial or breakdown compaction. Intermediate rolling shall be performed with a two—axle tandem roller when breakdown rolling is performed with a pneumatic roller.

Each layer of the asphalt pavement shall be additionally compacted, without delay, by a final rolling consisting of not less than one coverage with a steel—tired roller weighing not less than eight (8) tons. Compaction of the control strip shall commence as soon as possible after placement of the mixture and be continuous and uniform over the entire control strip.

The following procedure shall be used on the control strip:

- (a) Breakdown rolling. Fifteen (15) or thirty (30) second nuclear density counts shall be taken at ten (10) randomly selected locations after each roller coverage at each test site. Rolling shall continue until there is no measurable increase in average density per roller coverage.
 - (b) Intermediate rolling. Rolling shall continue until at least three (3) complete coverages have been made and there is no measurable increase in average density per roller coverage.
 - (c) Finish rolling. Fifteen (15) or thirty (30) second nuclear density counts shall be taken at ten (10) randomly selected locations after each roller coverage at each test site. The average density obtained after the first coverage shall be taken as a new beginning point. Final rolling shall begin as soon as pavement temperature will permit and shall continue until all roller marks are removed and there is no measurable increase in average density per roller coverage.
 - (d) Density standard. Ten (10) randomly selected one—minute density counts shall be taken to determine the average density of the control strip. This is the density standard for the project until a new control strip is constructed.
2. Conformance Strips. Conformance density testing will be accomplished while the asphalt pavement is hot enough to permit further densification if such is shown to be necessary.

The pavement courses shall be divided into conformance strips consisting of not more than twenty—five hundred (2,500) tons for the purpose of defining areas represented by each series of density conformance tests.

Compaction shall be performed using the rollers, number of coverages and techniques employed in compaction of the control strip.

Any pavement placed, which is not in conformance with the approved compactive procedures determined by the control strip, may be rejected by the Engineer and ordered removed at the Contractor's expense.

The density of each conformance strip will be evaluated based on the results of five (5) tests with a portable nuclear test device performed at randomly selected sites within the acceptance section. The average density obtained for the five (5) tests in each conformance strip shall be at least ninety—eight percent (98%) of the mean density obtained in the approved control strip. In addition, each individual test value obtained within an acceptance strip shall be at least ninety—five percent (95%) of the mean density of the strip.

If either the average density of the conformance strip or an individual test value does not meet the conformance requirements, the Contractor shall continue his/her compactive effort until the required density is obtained. If unobtainable, then a new control strip will be required.

After the required density has been attained in the acceptance strips, further finish rolling may be necessary to remove roller marks or other surface irregularities and to meet the required surface tolerances. That portion of the price adjustment method, which pertains to compaction of asphalt pavement, shall not apply when the control strip method of density control is utilized.

3. Control by Relative Density. Rolling shall continue until all roller marks are eliminated and a minimum density of ninety—three percent (93%) and a project average density of ninety—five percent (95%) of the job mix formula design density is obtained.
4. Compaction by Coverage. Initial rolling shall be done with a steel—wheeled tandem roller and/or a suitable pneumatic tired roller. Initial rolling shall be completed while the mat temperature is above 225°F.

Following the initial rolling, at least three complete coverages of the pavement shall be completed with a pneumatic—tired roller, while the mat temperature is above 175°F.

Final rolling shall be completed with a ten (10) ton minimum weight steel—wheeled tandem roller and shall continue until roller marks and further compacting are not evident in the pavement and the finished surface conforms to Section 401—3.15.

0. Joints:

Placing of the asphalt paving shall be as continuous as possible. Rollers shall not pass over the unprotected end of a freshly laid mixture unless authorized. Transverse joints shall be formed by cutting back on the previous run to expose the full depth of the course.

Improperly formed joints resulting in surface irregularities shall be removed, full depth, replaced with new material, and thoroughly compacted. Attempting to roll out an improper joint after the material has cooled below 165°F. shall not be allowed. All pavement removal shall be precut to a neat line using a power driven saw or other approved tools.

When joining an old existing pavement and new pavement, the old pavement shall be cut in a neat line, with a power driven saw or approved equivalent.

A fog spray of emulsified asphalt shall be placed on all cold joints including longitudinal joints. The emulsified asphalt shall be diluted with an equal amount of water.

P. Pavement Samples:

If required, the Contractor shall cut, within twenty—four (24) hours of final rolling, full depth samples as directed, from the finished mat, for testing. Samples shall be neatly cut by a saw, core drill, or other approved equipment. Each sample shall be one slab of at least eight inches by eight inches, or two cores, each with a minimum six inch diameter. The Contractor shall supply and finish new material to backfill voids left by sampling within twenty—four (24) hours.

Additional samples will be taken whenever a substantial change has been made in the job mix formula.

Q. Surface Tolerances:

The surface will be tested immediately after final rolling at selected locations using a ten foot straight edge. The variation of the surface shall at no point exceed three—sixteenths inch. All humps or depressions exceeding the specified tolerance shall be corrected by removing defective work and replacing it with new material as directed at no additional expense to the Owner.

R. Thickness Requirements:

The pavement shall be compacted to a finished thickness that does not vary from the design thickness by more than one—quarter inch.

Core samples shall be taken of compacted pavement from locations designated by the Engineer who shall measure the thickness of each sample after striking off loose aggregate. If the average thickness of the samples is one—quarter inch or more, less than the design thickness, the Contract price for asphalt concrete will be adjusted by a factor “K” where:

$$“K” = \frac{\text{average thickness of core samples}}{\text{design pavement thickness}}$$

Please note that the maximum allowable thickness of an individual sample shall be the design —thickness plus one—quarter inch. For example: If the design thickness is two and one—half inches and an individual sample thickness is three inches, the individual sample thickness used to enter into the average shall be two and three—quarter inches.

This price adjustment shall be applied after Contract price adjustments in accordance with 401—4.02. No credit will be allowed for an average thickness in excess of the design shown on the plans.

401—4.00 MEASUREMENT AND PAYMENT

401—4.01 GENERAL

Payment for asphalt will not be made until it is installed in place.

401—4.02 MEASUREMENT

A. General:

Asphalt concrete and asphalt cement will be measured by the ton or by the square yard in accordance with Section 108. Batch weights will not be permitted as a method of measurement, unless the alternative provisions of Sections 401—3.02 D.1.a. are met, in which case the cumulative weight of all batches will be used for payment. The tonnage used shall be the weight used in the accepted pavement and no deduction will be made for the weight of asphalt material and anti—stripping additive in the mixture.

When specified in the contract as a pay item, the quantity of asphalt material will be the number of tons used in the accepted work.

The method of measurement to be used in determining the basis of payment for Asphalt Cement will be based on information obtained in one only of the following procedures, except as provided in Section 401—3.02 D.1.a. The Engineer shall approve in writing the procedure to be used.

1. Supplier’s invoices minus waste, diversion and excess left over. This method may be used on projects where deliveries are made in sealed tankers and the plant is producing material for one project only. Method 2 will be used to compute left over. Waste and diversion will be computed in a manner to be determined by the Engineer.
2. Volume measure (tank stickings) of actual daily uses. It is the Contractor’s responsibility to notify the Engineer whenever material is to be added to the calibrated volume measure or whenever material from the volume measure is to be used for work other than that specified in this contract.

Whichever method is used must be used for the duration of the project. The other methods may be used and computed as a check, but only one method will be used for payment computation.

3. Total weight of delivered mix minus the weight of dry aggregate as determined by Alaska T—23. This method is to be used only when methods 1 and 2 above are not feasible.

Anti—stripping additive is a contingent sum pay item and the quantity for payment will be specified as provided in Section 108. No deduction will be made for the weight of the anti—stripping additive addition in the asphalt cement.

When measured by the square yard, the total area of pavement will be determined by the “Contract Quantity” determined from the plans. The Contractor should verify the estimated quantities prior to bid. Payment shall be made for the Contract Quantity unless additional work is authorized in writing by the Engineer.

B. Contract Price Adjustments:

The following method of price adjustment will be applied to Item 401(1), Asphalt Concrete when the contract quantity for each type of Asphalt Concrete equals or exceeds twenty—five hundred (2,500) tons.

The quantity of each type of Asphalt Concrete produced and placed shall be divided into lots and these lots evaluated individually for acceptance.

A lot will be twenty—five hundred (2,500) tons. In addition, there will be an allowance of one hundred (100) tons at the initial start of a project on which no price adjustment will be computed or applied and the material will be accepted on the basis of substantial conformity. This will allow for the natural variations in the beginning of projection.

Should visual examination reveal that the material in any load is obviously contaminated or segregated, that load will be rejected. In the event it becomes necessary to determine quantitatively the quality of material in a rejected load, the test result will not be included in the mean results of those tests constituting a lot.

A lot will normally be represented by five (5) samples and subdivided into equal sub—lots for random sampling and testing in accordance with Alaska Department of Transportation and Public Facilities procedures. Should the end of a construction season or other unforeseen prevent taking five (5) samples, the price adjustment formula will be applied to the actual number of test results. Sampling may be from the hauling unit, from the hopper of the laydown machine or from in front of the screed just prior to final placement.

Materials or work will be evaluated for adjustment when deviation from the specification occurs in the individual test results of any of the samples comprising the acceptance lot for which a price reduction factor is listed in the following table. Prior to computing a reduction in price, the validity of the failing test results shall be ascertained in accordance with Alaska Test Method T—19. The valid individual test values will then be averaged and the percent of the price reduction for the lot will be determined by applicable formula as follows:

1. The formula, $P = (X_n + aR - T_u)F$ will be used if a maximum limit only is specified or; when the average of the test values representing the lot is above the mid—point of the specification band or above the job—mix formula.
2. The formula, $P = (T_L + aR - X_n)F$ will be used if a minimum limit only is specified or; when the average test values representing the lot is below the mid—point of the specification band or below the job—mix formula value.

Where:

P is the percent of reduction in contract price,

X_n is the average of lot test values, with “n” the number of values,

a variable to be used as “n” changes according to the following:

n=3	a=.5
n=4	a=.4
n=5	a=.3

(Acceptance of lots on which less than three tests have been performed shall be accepted on the basis of substantial compliance)

R difference between highest and lowest values in the group test results from the lot,

T_u is the upper or maximum tolerance limit permitted by the specifications,

T_L is the lower or minimum tolerance limit permitted by the specifications, and

F is the price reduction factor to be applied for each element as shown in the following table:

TABLE OF PRICE REDUCTION FACTOR

<u>Element</u>	<u>Factor "F"</u>
100 percent size sieve	1
1/2 inch size sieve and larger	1
No. 100 sieve to 3/8 inch sieve inclusive (except 100% size)	3
No. 200 sieve	6
Compaction, bituminous mixture	7
Asphalt content (by extraction all asphalt aggregate mixtures AASHTO T164 or Alaska T—23)	25

- In cases where one or more elements show a positive P value, such positive values will be added and the resulting sum will be used to determine whether the material is in reasonably close conformity. If the total P is less than 3, or a negative quantity, the material will be accepted as being in reasonably close conformity. If the total P value is between 3 and 25, the Engineer may require correction or he/she may accept the material at a reduced price. If the total P is greater than 25, the Engineer may: (a) require complete removal and replacement with specification material at no additional cost to the Owner; (b) require corrective action to bring the material into reasonably close conformity at no additional cost to the Owner; or (c) where the finished product is found to be reasonably acceptable for the intended purpose permit the Contractor to leave the material in place with an appropriate price adjustment which may range from no payment to that which would have occurred had P = 25.

401—4.03 PAYMENT

The accepted quantity determined as provided above, shall be paid for at the contract price per unit of measurement for the pay item listed below, complete in place.

Anti—stripping additives will be paid for as specified in the Special Provisions.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
401(1)	Asphalt Concrete, Type _____	Ton
401(2)	Asphalt Cement	Ton
401(3)	Asphalt Concrete, Type _____	Square Yard
401(4)	Anti—Stripping Additive	Contingent Sum
401(5)	Open Graded Asphalt Concrete Type _____	Ton
401(6)	Asphalt Concrete	Lump Sum
401(7)	2” hot asphalt curb cut ramp	Square Yard

When more than one type of Asphalt Concrete appears on the plans and bid schedule, letter suffixes shall be included within the parentheses of the pay item numbers in order to differentiate between the different types.

END OF SECTION

SECTION 402 TACK COAT

402—1.00 GENERAL

402—1.01 DESCRIPTION

A. Work Included:

This work shall consist of furnishing and placing asphalt on a prepared surface in accordance with these specifications.

B. Related Work Described Elsewhere:

1. Section 401 Asphalt Concrete Pavement

C. Work Installed but Furnished Under Other Directives

1. Not Used

D. Work Furnished but Not Installed:

1. Not Used

402—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers

1. Not Used

B. Qualifications of Installers

1. Not Used

C. Codes and Standards

1. Not Used

D. Source Quality Control

1. Not Used

402—2.00 PRODUCTS

402—2.01 MATERIALS STANDARDS

A. General:

Materials shall conform to the standards listed in these specifications

B. Asphalt Material:

The type and grade of asphalt material shall be as shown in the bid schedule.

The asphalt material shall conform to the applicable requirements of Section 702, and will be conditionally accepted at the source.

402—3.00 EXECUTION

402—3.01 CONDITIONS

A. Inspection:

Prior to all the work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

402—3.02 INSTALLATION

A. Equipment:

The Contractor shall provide equipment for heating and applying the asphalt material. This equipment shall conform to the following requirements:

The distributor shall be so designed, equipped, maintained and operated that asphalt material at even heat may be applied uniformly on variable widths of surface up to fifteen feet at readily determined and controlled rates from 0.05 to 0.50 gallons per square yard, with uniform pressure, and with an allowable variation from any specified rate not to exceed 0.02 gallons per square yard. Distributor equipment shall include a tachometer, pressure gauges, a calibrated tank and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump, and full circulation spray bars adjustable laterally and vertically.

B. Preparation of Surface to be Treated:

The existing surface shall be patched and cleaned and shall be free of irregularities to provide a reasonably smooth and uniform surface to receive the treatment. Unstable corrugated areas shall be removed and replaced with suitable patching materials. Payment for the patching will be made at the contract unit price for the various items used unless a reconditioning item is included in the contract. The edges of existing pavements, which are to be adjacent to new pavement, shall be cleaned to permit the adhesion of asphalt materials.

C. Application of Asphalt Material:

The tack coat shall be uniformly applied with a pressure distributor in such manner as to offer the least inconvenience to traffic and to permit one—way traffic without pick—up or tracking of the asphalt material.

Tack coat shall not be applied on a wet surface or when the ambient air temperature is below 40°F.

Application of tack coat shall be limited to that amount which can be covered by one day's paving operation.

Emulsified asphalt for tack shall be diluted with an equal amount of water and mixed. The quality and temperature of the water shall be such that asphalt will not separate from the emulsion before application. The resultant diluted emulsion shall be applied at a rate of 0.05 to 0.10 gal/yd².

402-4.00	MEASUREMENT AND PAYMENT
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402—4.01 GENERAL

Not Used.

402-4.02 MEASUREMENT

The asphalt material for tack coat will be measured by the ton in accordance with Section 108, including water.

402—4.03 PAYMENT

The accepted quantities of tack coat will be paid for at the contract unit price per ton for asphalt material, complete in place, or by lump sum.

Payment will be made under:

<u>Pay Item Number</u>	<u>Pay Item</u>	<u>Pay Unit</u>
402(1)	CCS 1 Asphalt for Tack Coat	Ton
402(2)	CSS 1 Asphalt for Tack Coat	Lump Sum

END OF SECTION

SECTION 403 PRIME COAT

403—1.00 PRIME COAT

403—1.01 DESCRIPTION

A. Work Included:

This work shall consist of preparing and treating a previously prepared roadbed with asphalt material, and blotter material, if required, in accordance with these specifications and in reasonably close conformance with the lines shown on the plans.

B. Related Work Described Elsewhere:

1. Section 401 Asphalt Concrete Pavement

C. Work Installed but Furnished Under Other Directives:

1. Not Used

D. Work Furnished But Not Installed:

1. Not Used

403—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

1. Not Used

B. Qualifications of Installers:

1. Not Used

C. Codes and Standards:

1. Not Used

D. Source Quality Control:

1. Not Used

403—1.03 SUBMITTALS

A. Not Used

403—1.04 PRODUCT/MATERIAL HANDLING

A. Not Used

403—2.00 PRODUCTS

403—2.01 MATERIALS STANDARDS

A. General:

Material shall conform to the standard listed in these specifications.

B. Asphalt Material:

The type and grade of asphalt material shall be as shown in the bid schedule.

The asphalt material shall meet the applicable requirements of Section 702, and will be conditionally accepted at the source.

C. Blotter Material:

Blotter material shall be suitable clean sand.

403—3.00 EXECUTION

403—3.01 CONDITIONS

A. Inspection:

Prior to all the work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

403—3.02 INSTALLATION

A. Weather Limitations:

Asphalt material shall not be applied on a wet surface, when the temperature is below 45°F. or when weather conditions would prevent the proper penetration of the prime coat.

B. Equipment:

The Contractor shall provide equipment for heating and applying the asphalt material and for applying blotter material. The distributor equipment shall conform to the requirements set forth in Section 402—3.02 of these specifications.

In addition, one self—propelled aggregate spreader of approved design and a rotary paver broom shall be provided by the Contractor.

C. Preparation of Surface:

The surface to be primed shall be shaped to the required grade and section, shall be free from all ruts, corrugations, segregated material or other irregularities and shall be uniformly compacted. Non—specification materials shall be removed from the surface immediately prior to application of the asphalt material.

Delays in priming will necessitate reprocessing or reshaping to provide a smooth compacted surface.

D. Application of Asphalt Material:

Asphalt material shall be applied to the width of the section to be primed by means of a pressure distributor in a uniform, continuous spread. When traffic is maintained, not more than one—half of the width of the section shall be treated in one application. Care shall be taken that the application of asphalt material at the junctions of spreads is not in excess of the specified amount. Excess asphalt material shall be squeegeed from the surface. Skipped areas or deficiencies shall be corrected. Building paper shall be placed over the end of the previous applications and the joining application shall start on the building paper. Building paper used shall be removed and satisfactorily disposed of.

When traffic is maintained, one—way traffic shall be permitted on the untreated portion of the roadbed. As soon as the asphalt material has been absorbed by the surface and will not pick up, traffic may be transferred to the treated portion and the remaining width of the section primed.

The quantities, rate of application, temperature and areas to be treated shall be approved before application of the prime coat.

E. Application of Blotter Material:

If, after the application of the prime coat, the asphalt material fails to penetrate and dry, and traffic must be routed over the primed surface, or rain is imminent, blotter material shall be applied as directed.

Only with written approval shall blotter material be applied sooner than four (4) hours after application of the asphalt material.

403—4.00 MEASUREMENT AND PAYMENT

403—4.01 GENERAL

Payment for prime coat will not be made until the material is in place and accepted for placement of asphalt.

403—4.02 MEASUREMENT

Asphalt material will be measured by the ton in accordance with Section 108, Measurement and Payment. Blotter material will not be measured for payment but will be considered incidental.

403—4.03 PAYMENT:

The accepted quantity of prime coat as determined above shall be paid for at the contract price per unit of measurement complete in place.

Payment will be made under:

<u>Pay Item Number</u>	<u>Pay Item</u>	<u>Pay Unit</u>
403(1)	RC___Liquid Asphalt for Prime Coat	Ton
403(2)	MC___Liquid Asphalt for Prime Coat	Ton

END OF SECTION

SECTION 404

RESERVED

SECTION 405 SURFACE TREATMENT

405—1.00 GENERAL

405—1.01 DESCRIPTION

A. Work Included:

This work shall consist of the construction of a single or multiple course bituminous surface treatment in accordance with these specifications and in conformity with the lines shown on the plans or established by the Engineer.

B. Related Work Described Elsewhere:

Not Used.

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

405—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used.

C. Codes of Standards:

Not Used.

D. Source Quality Control:

Not Used.

405—1.03 SUBMITTALS

Not Used.

405—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

405—2.00 PRODUCTS

405—2.01 MATERIALS STANDARDS

A. General:

All materials used for surface treatment shall conform to these specifications.

B. Related Work Described Elsewhere:

1. Asphalt Materials:

The types and grades of asphalt material shall be specified in the Contract.

Asphalt materials shall be approved by the Engineer prior to use in the work, provided however, that the Engineer may accept a certified analysis by the refinery laboratory when a copy of the certified analysis accompanies each shipment of asphalt to the project. The Engineer shall reserve the right to make check tests of the asphalt received on the job and, if the system of certified analysis proves to be unsatisfactory, he/she may discontinue this arrangement.

Cut back asphalts shall conform to the requirements of ASTM D2028 or AASHTO M81.

Cationic emulsified asphalt shall conform to the requirements of ASTM D2397 or AASHTO M208.

2. Aggregates:

Aggregates for surface treatment and seal coats shall consist of clean, tough, durable fragments of crushed gravel or crushed stone, free from dirt or other objectionable matter and shall meet the requirements for gradings given hereafter in this Article under Table 405-1. The aggregate shall not have a percentage of wear greater than 40 at 500 revolutions as determined by AASHTO T96 (ASTM Standard Design C131). The sodium sulfate soundness loss shall not exceed nine percent or the magnesium sulfate soundness loss shall not exceed twelve percent as determined by AASHTO T104, (ASTM C88). Aggregate shall be free from clay balls and adherent films of clay or rock dust. Water content shall not exceed two percent. Not less than ninety percent by weight shall be particles having at least one fractured face.

Aggregate shall be of such nature that coating it thoroughly with bituminous material of the type to be used in the work will result in a retention of not less than 70 percent of the amount of bituminous material applied when determined by static immersion test Alaska Test Method T-14. An approved anti-stripping additive may be used to obtain the required resistance to stripping if necessary.

Blotter material shall be a clean sand suitable to the Engineer.

TABLE 405—1
AGGREGATE GRADING REQUIREMENTS*

Sieve Designation	Grading A	Grading B	Grading C	Grading D	Grading E	Grading F	Grading G
1-1/2	100	-----	-----	-----	-----	-----	-----
1 inch	90—100	-----	-----	-----	-----	-----	-----
3/4 inch	-----	90—100	100	-----	-----	-----	-----
1/2	0— 15	20— 55	90—100	100	100	-----	-----
3/8	-----	0— 15	40— 75	90—100	100	100	100
No. 4	-----	0— 5	0— 15	0— 20	10— 30	75—100	85—100
No. 8	-----	-----	0— 5	0— 5	0— 8	0— 10	60—100
No. 200	0— 1	0— 1	0— 1	0— 1	0— 1	0— 1	0— 10

*As determined by AASHTO T11 and T27.

TABLE 405—2
APPLICATION TEMPERATURES

Type & Grade of Asphalt	Spray °F
RC—250	140—225*
RC—800	175—225*
RS—1	75—130
RS—2	110—160
CRS—1	75—130
CRS—2	110—160
CSS—1	75—130
CSS—1h	75—130

*Exact Temperature-viscosity relationship determined by the Engineer.

TABLE 405—3
QUANTITIES OF ASPHALT AND AGGREGATE FOR
SURFACE TREATMENT AND SEAL COATS*

Line Number	Size of Aggregate	Grade	Lbs. of Aggregate per Sq. Yd.	Gallons of Asphalt per Sq. Yd.	Type of Asphalt
1.	1 to 1/2	A	50 — 70	.50 — .70	RC—800, RS—2 CRS—1, CRS—2
2.	3/4 to 3/8	B	40 — 60	.40 — .60	Same
3.	1/2 to No.4	C	25 — 40	.25 — .40	RC—250, RC—800 RS—1, RS—2 CRS—1, CRS—2
4.	3/8 to No.8	D & E	15 — 30	.15 — .30	Same
5.	1/4 to No.8	F & G	10 — 25	.10 — .25	Same
6.	Sand		10 — 15	.10 — .15	RC—250, RC—800 RS- 1 CRS—1, CRS—2 CSS—1, CSS—1h

* These quantities and types of materials shall be directed by the Engineer.

The lower application rates of asphalt shown in the table should be used for aggregate having gradings on the fine side of the limits specified. The higher application rates should be used for aggregate having gradings on the coarse side of the limits specified.

The weight of aggregate shown in the table is based on aggregate with a specific gravity of 2.65. In case the specific gravity of the aggregate used is less than 2.55 or more than 2.75 the amount shown in the table above should be multiplied by the ratio which the bulk specific gravity of the aggregate used bears 2.65.

NOTE

Single Surface Treatments. The maximum size aggregate should not be over one-half inch. Use line 3. For lighter surface treatments, use line 4 or 5; however, line 4 and 5 are more for light seal coats. For sand seals use line 6.

Double Surface Treatments. The maximum size aggregate can be up to three-quarters inch (3/4"). When a double course surface treatment is specified, the aggregate courses shall be either 1) B then C or; 2) B then E as specified in the plans or as directed by the Engineer.

Triple Surface Treatments. The maximum size aggregate is usually three-quarter inch. The following is recommended; first course, line 1 or 2, second course, line 2 or 3, third course, line 3, 4, or 5. For most situations, the best probably is lines 2, 3, and 5 for the three courses.

405—3.00 EXECUTION

405—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

405—3.02 INSTALLATION

A. General:

Weather Limitations:

Bituminous material shall not be placed during rainy or threatening weather, or when moisture on the surface to be treated would prevent satisfactory bond. The surface coats shall not be applied when the air temperature is below 50°F in the shade, unless otherwise approved by the Engineer.

B. Equipment:

1. General:

All equipment used on this work shall be of sufficient size and in such mechanical condition as to meet the requirements and to produce work of the specified quality. The design and construction of all equipment shall be approved by the Engineer before any work is started.

2. Pressure Distributor:

The Distributor shall be so designed, equipped, maintained, and operated that asphalt

material at even heat may be applied uniformly on variable widths of surface up to fifteen feet at readily determined and controlled rates specified in gallons per square yard, with uniform pressure, and with an allowable variation from any specified rate not to exceed 0.02 gallons per square yard. Distributor equipment shall include a tachometer, pressure gauges, accurate volume measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump, and full circulation spray bars adjustable laterally and vertically. A hose and spray nozzle attachment shall be provided for applying asphaltic material to patches and areas inaccessible to the spray.

3. Aggregate Spreader:

The spreader shall be self propelled and capable of spreading the surfacing aggregate accurately and uniformly in the specified amounts per square yard.

4. Rollers:

A self propelled, steel wheeled, tandem roller shall weigh between five and eight tons. A pneumatic tired roller shall be self propelled and have a total compacting width of not less than sixty inches with a gross weight adjustable to apply two hundred to three hundred fifty pounds per inch of rolling width as directed. Tire pressure or contact pressure may be specified for pneumatic tire rollers. They shall be operated a maximum speed of five miles per hour (5 mph). They shall be equipped with water jet cleaners that prevent asphalt from sticking.

5. Hauling Equipment:

The cover aggregate shall be transported from the plant to the site in trucks having tight, clean, smooth beds.

6. Miscellaneous Equipment:

A rotary power broom and necessary hand tools, thermometers, etc. shall be provided by the Contractor.

C. Preparation of Surfaces:

The seal coating operation shall not be started until the surface has been completely repaired, thoroughly compacted and cleaned of all dust, dirt, or other loose material, as required, and the section is approved by the Engineer.

A curing period of 12 hours will be required between the application of the prime coat and the next application of asphalt material.

During the period between the application of the prime coat and seal coat, the primed surface shall be kept in repair. All holes, ravels and areas deficient in prime shall be patched and repaired with asphalt treated materials, by penetration methods or other approved procedures.

D. Applying Asphalt Material:

Asphalt material shall be applied by means of a pressure distributor in a uniform, continuous spread over the section to be treated and within the temperature range specified in Table

405—2. The quantity of asphalt material to be used per square yard shall be as directed within limits of Table 3. If the texture of the surface is such that asphalt material penetrates too rapidly, a preliminary application of from 0.05 to 0.10 gallon per square yard of surface may be required. A strip of building paper, at least three feet in width and with a length equal to that of the spray bar of the distributor plus one foot, shall be used at the beginning of each spread. If the cut—off is not positive, the use of paper may be required at the end of each spread. The paper shall be removed and disposed of in a satisfactory manner. The distributor shall be moving forward at proper application speed at the time the spray bar is opened. Any skipped areas or deficiencies shall be corrected. Junctions of spreads shall be carefully made to assure a smooth riding surface.

Spreading asphaltic material shall be discontinued sufficiently early in the day to permit the termination of traffic control prior to darkness. Asphaltic material shall be applied to only one (1) designated traffic lane at a time and the entire width of the designated lane shall be covered in one (1) operation.

The length of spread of asphalt material shall not be in excess of that which trucks, loaded with cover coat material, can immediately cover.

The spread of asphalt material shall not be more than six inches wider than the width covered by the cover coat material from the spreading device. Under no circumstances shall operations proceed in such a manner that asphalt material will be allowed to chill, set up, dry, or otherwise impair retention of the cover coat. Wherever asphalt material meets existing road surface an overlap of six inches is required on the first coat, and an overlap of twelve inches is required on the second coat.

When applying asphalt material without a cover coat, rolling of the asphalt material shall begin immediately upon application thereof and continue until there is no longer evidence of any kneading action. Prior to discontinuing the rolling operation, the Contractor shall provide for at least one (1) complete roller coverage of the roadway.

The distributor, when not spreading, shall be parked so that the spray bar or mechanism will not drip asphalt materials on the surface of the traveled way.

During all applications, it shall be the Contractor's responsibility to protect all structures, trees, fences, parked cars, etc., adjacent to the project from damage due to prime coat mist as a result of his/her operation. Any objects so damaged, whether publicly or privately owned, shall be entirely the liability of the Contractor and the Owner shall in no way be held responsible for such damage. No bituminous material shall be discharged in a gutter, ditch, or elsewhere on, or adjacent to, the project.

E. Application of Cover Coat Material:

Within one minute following the application of the asphalt material, cover coat material shall be spread in quantities as designated within limits of Table 3. Spreading shall be accomplished in such a manner that the tires of trucks, or aggregate spreader, at no time contact the uncovered and newly applied asphalt material.

The cover coat material shall be moistened with water as directed by the Engineer. Moistening shall be done the day before the aggregate is used.

Immediately after the cover coat material is spread, any deficient areas shall be covered by additional material. Initial rolling shall begin within one minute behind the spreader by the

self-propelled pneumatic roller followed by the steel wheeled tandem roller. Rolling shall proceed in a longitudinal direction, beginning at the outer edges of the treatment and working toward the center.

Each trip shall overlap the previous trip by one half the width of the front wheels or roll. The first rolling of the mineral aggregate shall be completed within fifteen minutes after it has been spread. Rolling shall continue only until a smooth, thoroughly compacted surface is obtained as determined by the Engineer. Under no circumstances will the rolling continue until the cover material is crushed or pulverized. If the cover material is distributed or thrown off the surface by traffic, it shall be broomed back into place. Areas with a deficiency or excess of cover material shall be corrected.

When the surface treatment is finished one half width at a time, from four to six inches of the inside edge shall be left uncovered with aggregate to allow for an overlap of asphaltic binder when the remaining half of the surface is treated.

If successive seal coats are to be applied, a curing period of at least twenty-four (24) hours shall elapse between the application of successive coats. During this period, all fat, lean, or bleeding areas shall be corrected as directed by the Engineer.

F. Maintenance of Surface:

After application of the cover material, the surface shall be maintained by the Contractor, from 2—5 days depending on the weather. During this period the Contractor shall, at least once daily, redistribute the cover material that has become displaced by traffic, by means of brooms, a drag or other method satisfactory to the Engineer. When all possible material has been imbedded in the bituminous material, to the satisfaction of the Engineer, the Contractor shall sweep the pavement surface of all excess material and remove it to a location designated by the Engineer.

G. Traffic Control:

Traffic shall be kept off freshly sprayed asphalt. If it is necessary to route traffic over the new treatment, speed shall be restricted to seven miles per hour (7 mph), or less, until rolling is completed and the asphalt has taken its initial set. Speed shall then be restricted to twenty-five miles per hour (25 mph), or less, until the Engineer directs the end of traffic control.

405—4.00 MEASUREMENT AND PAYMENT

405—4.01 GENERAL

Bituminous Surface Treatment shall be measured by the square yard of surface area. The work to be included as part of this bid item is as follows:

1. Providing and installing asphalt and cover coat material as described in other portions of this specification.

405—4.02 MEASUREMENT

The total square yards of Bituminous Surface Treatment shall be based on the pay widths and lengths as described on the plans. The pay width of a trend in an existing roadway includes a

twelve inch overlap of the existing Bituminous Surface Treatment surface on all sides of the trench. The Contractor shall provide the Engineer with weigh tickets for asphalt and cover coat material as the Engineer requests to verify proper application rates. If the application rates specified vary by more than ten percent (10%), a reduction in the unit price for Bituminous Surface Treatment may result.

405—4.03 PAYMENT:

Payment for these items shall include full payment for all work described in this section.

Payment will be made under:

<u>Pay Item Number</u>	<u>Pay Item</u>	<u>Pay Unit</u>
405(6)	Bituminous Surface Treatment	Square Yard

END OF SECTION

SECTIONS 406 - 499

RESERVED

SECTION 501 STRUCTURAL CONCRETE

501—1.00 GENERAL

501—1.01 DESCRIPTION

A. Work Included:

This work shall consist of furnishing and placing Portland cement concrete for structures, utility, drainage, minor structures, and incidental construction in conformance with the plans or as established.

B. Classification:

The following classes of concrete shall be used where required:

Class A concrete shall be used for reinforced and non—reinforced concrete structures, unless otherwise specified. All Class A concrete will reach a 28 day strength of 3,500 psi or higher and shall be a 6 sack mix as specified in Table 501—1. Class A concrete shall be used for catch basins, valley gutters, concrete saddles, telephone duct, sidewalks, and curbs and gutters.

Class S concrete shall be used for all concrete deposited under water, unless otherwise specified.

Class W concrete shall be used for all minor concrete construction, unless otherwise specified.

Class A-A concrete shall be used for all cast—in—place bridge decks unless otherwise specified.

C. Related Work Described Elsewhere:

1. Section 503 Reinforcing Steel

D. Work Installed but Furnished under Other Directives:

1. Not Used

E. Work Furnished But Not Installed:

1. Not Used

501—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

1. Not Used

B. Qualifications of Installers:

1. Not Used

C. Codes and Standards:

- | | | |
|----|--------------|--|
| 1. | ASTM C—39 | Compressive Strength of Concrete Cylinders |
| 2. | Alaska T—8 | Air Content of Freshly Mixed Concrete |
| 3. | AASHTO T—119 | Slump Test of Concrete |
| 4. | Alaska T—7 | Sieve Analysis |

D. Source Quality Control:

The Contractor shall establish and maintain control of the work covered under this section to insure compliance with the Contract requirements, including but not limited to the items listed below.

1. Twice a week when concrete is being produced the Contractor shall make a mechanical analysis of course and fine aggregates being used as delivered to the mixer.
2. Prior to concrete placement the Contractor assure that:
 - a. Embedded items are properly located and supported.
 - b. Forms are true to line and grade, provided with grade strips, coated, tight and structurally adequate.
 - c. Adequate vibrators are on hand and operable.
 - d. Approved curing materials are on hand.
3. During concrete placement the Contractor shall assure that:
 - a. Specified concrete consistency is maintained by slump test check. One test for each twenty cubic yards (20 c.y.) or fraction thereof.
 - b. A Record of concrete quality is maintained by compressive strength tests. Test cylinders to be taken for each fifty cubic yards (50 c.y.) of concrete supplied.
 - c. Concrete is consolidated.
 - d. Placement is accomplished within the specified time after mixing.
 - e. Transit mix concrete is placed within the specified time after batching.
4. After concrete placement the Contractor shall assure that:
 - a. Forms are left in place an adequate time so as not to injure the concrete.
 - b. Specified finish is obtained.
 - c. Curing protection is installed and maintained.
 - d. Protection against vandalism is provided.

501—1.03 SUBMITTALS

- A. A notarized statement is required of the concrete supplier that he/she has read and fully understands the concrete specifications. This must be submitted to the City of Fairbanks before the Contract is signed.

501—1.04 PRODUCT/MATERIAL HANDLING

- A. Not Used

501—2.00 PRODUCTS

501—2.01 MATERIALS STANDARDS

- A. General:

Materials shall conform to the standards listed in these specifications.

- B. Materials

Materials shall conform to the following:

Fine Aggregate	703—2.01
Coarse Aggregate	703—2.02
Portland Cement	701—2.01
(Portland Cement shall be Type I, II, or III)	
Water	712—2.01
Air Entraining	711—2.02
Curing Materials	711—2.01
Joint Materials	705

- C. Shipping and Storage:

Cement may be shipped from pretested approved bins. The cement shall be well protected from rain and moisture, and any cement damaged by moisture or which fails to meet any of the specified requirements shall be rejected and removed from the work. Cement stored by the Contractor for a period longer than sixty (60) days in other than sealed bins or silos shall be retested before being used. Cement of different brands, types, or from different mills shall be stored separately.

501—3.00 EXECUTION

501—3.01 CONDITIONS

- A. Inspection:

Prior to all the work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

501-3.02 INSTALLATION

A. Proportioning:

1. Determining the Proportions and Batch Weights:

The proportions and batch weights of the various components of concrete shall be determined as prescribed below. The determinations shall be made after the materials furnished by the Contractor have been approved.

The Engineer shall determine the preliminary proportions on the basis of trial mixes conducted with the materials to be used in the work. These proportions shall include amount of cement, fine and coarse aggregates (in a saturated surface—dry condition), and the approximate amount of water and air entraining agent required to conform to Table 501—1 per cubic yard of concrete.

The Contractor shall be responsible for producing and placing specification concrete and shall determine the final proportions including free moisture in the aggregates to produce concrete conforming to Table 501—1 with a cement content within tolerance of two percent (2%) for the particular class of concrete being made.

2. Adjustments in Proportions:

Adjustment for Variation in Workability: If it is found that the concrete does not have the desired placeability and workability with the proportions originally designed, the Contractor upon approval may make such changes in aggregate proportions as are necessary provided that in no case shall the cement content originally designated be changed, except as provided hereinafter.

Adjustment for Variation in Yield: If the Cement content of the concrete, determined by means of the yield test, AASHTO T121, varies more than two percent (2%) from the designated value in Table 501—1, the proportions shall be adjusted by the Contractor to maintain a cement content within these limits. The water—cement ratio shall in no case exceed the specified amount.

Adjustment for Excess Water—Cement Ratio: If when using the designated cement content, it is impossible to produce concrete having the required consistency without exceeding the maximum allowable water—cement ratio specified in Table 501—1, the cement content shall be increased so that the maximum water—cement ratio will not be exceeded.

Adjustment for New Materials: No change in the source or character of the materials shall be made without due notice to the Engineer, and no new materials shall be used until the Engineer has approved such materials and has designated new proportions, based on tests of trial mixes as provided in Section 501-3.02A..1.

TABLE 501—1
CLASS OF CONCRETE

	A	S	W	A-A
Minimum Cement content In Sacks/Cu. Yd.	6.0	7.0	5.0	7.0
Maximum Water Cement Ratio in Gallons/Sacks	5.75	6.0	6.5	5.0
Slump Range In Inches	2-4	4-8	1-5	1-2.5
Entrained Air Range In Percentage	5±2	None	5±2	7±2
Coarse Aggregate AASHTO Gradation	*No. 4 and No. 67	*No. 4 and No. 67	*No. 4 and No. 67	No. 4** and No. 67
Fine Aggregate Tolerance On Fineness Modulus	0.2+	0.2+	0.2+	0.2+

* The coarse aggregate for Class A, A—A and S concrete shall be furnished in two separate sizes.

** Alternative sizes of coarse aggregate will not be allowed unless the Engineer certifies that the No. 4 gradation cannot be obtained.

Cement factors are based on 94—pound sacks.

The use of super plasticizers in the concrete mix to improve the workability of mixes with low water cement ratios may be permitted subject to approval.

The Contractor may, subject to prior approval in writing, use alternative sizes of coarse aggregate as shown in Table 1 of AASHTO M—43. If the use of an alternative size of coarse aggregate produces concrete which exceeds the permissible water—cement ration in Table 501—1, thereby requiring additional cement above that specified, no compensation will be made to the Contractor for the additional cement.

3. Polymer—Modified Concrete.

Polymer—modified concrete, when used for bridge deck protection, shall be substituted for the uppermost layer of deck concrete indicated on the plans.

The polymer—modified concrete additive for the overlay shall be Dow SM—100, Modifier A; Thermoflex 8002; Arco Dylex 1186; Deco—Rez 4776, or approved equal.

Portland cement for the overlay shall be Type I.

The modified concrete shall have the following proportions:

Minimum Cement Content (Sacks/C.Y.)	7.0
Maximum Water—Cement Ratio (Gals./Sack)	4.50
Slump Range (Inches)	2-4
Entrained Air	6% Max.
Coarse Aggregate (AASHTO Gradation)	No. 7
Fine Aggregate Tolerance on Fineness Modulus	0.2+

Consideration will be given to adjusting the mix design based on recommendations of the polymer modifier manufacturer.

The polymer additive shall be added to the mix at the time, and in the manner recommended by the manufacturer.

B. Batching:

Except as provided hereinafter, the handling, measuring, and batching of materials shall be done at a central batching plant.

1. Portland Cement:

Either sacked or bulk cement may be used. No fraction of a sack of cement shall be used. No fraction of a sack of cement shall be used in a batch of concrete unless the cement is weighed.

All bulk cement shall be weighed on an approved weighing device. The bulk cement weighing hopper shall be properly sealed and vented to preclude dusting during operation. The discharge chute shall not be suspended from the weighing hopper and shall be so arranged that cement will not lodge in it nor leak from it. The discharge mechanism of the bulk cement hopper shall be interlocked as follows: against opening before the full batch is in the hopper and while the hopper is being filled; against closing before the contents of the hopper are entirely discharged and the scales are back in balance; and against opening if the batch in the hopper is either over or under weight by more than one percent (1%) of the amount specified.

Accuracy of batching shall be within one percent (1%) of the required weight of cement.

2. Water:

Water may be measured either by volume or by weight. The accuracy shall be within one percent (1%). Unless the water is to be weighed, the water—measuring equipment shall include an auxiliary tank from which the measuring tank shall be filled. The measuring tank shall be equipped with an outside tap and valve to provide for checking the setting, unless other means are provided for readily and accurately determining the amount of water in the tank.

3. Aggregates:

Stockpiles shall be built up in a manner that will prevent segregation. Aggregates from different sources and of different gradings shall not be stockpiled together.

Aggregates shall be handled from stockpiles or other sources to the batching plants in such manner as to maintain a uniform grading of the material. Aggregates that have become segregated or mixed with earth or foreign material shall not be used. All aggregates produced or handled by hydraulic methods, and washed aggregates, shall be stockpiled or binned for draining at least twelve (12) hours before being batched. Rail shipment requiring more than twelve (12) hours will be accepted as adequate binning only if the car bodies permit free drainage. In case the aggregates contain high or non—uniform moisture content, storage or stockpile periods in excess of twelve (12) hours may be required.

Batching shall be so conducted as to result in the weights of aggregate required, within a tolerance of two percent (2%).

Binned aggregates containing ice or in a frozen condition will not be permitted nor will aggregates which have been heated directly by gas or oil flame or heated on sheet metal over an open fire. When aggregates are heated in bins, only steam—coil or water—coil heating will be permitted, except that other methods, when approved, may be used. If live steam is used to thaw frozen aggregate piles, drainage times comparable to those applicable for washed aggregates shall apply.

4. Bins and Scales:

The batching plant shall include adequate bins for each required size of aggregate, unless otherwise permitted. Each bin shall be designed to discharge freely into the weighing hoppers. Control shall be provided so that, as the quantity desired in the weighing hopper(s) is being approached, the material may be added slowly and shut off with precision. Means of removing an overload of any material shall be provided. Hoppers shall be constructed so as to eliminate accumulations of tare materials and to fully discharge without jarring the scales. Partitions between bins and hoppers shall prevent spilling. All batching plant structures shall be maintained level to the accuracy required by the design of the weighing mechanism.

Satisfactory devices shall be provided at the bins or at the concrete mixer for weighing or measuring air—entraining admixtures, or other additives.

The scales for weighing aggregates and cement shall be either the horizontal beam or the springless—dial type, designed as an integral unit of the batching plant, accurate within a tolerance of one—half percent (1/2%).

When beam type scales are used, a “tell—tale” dial shall be provided for indicating to the operator that the required load in the weighing hopper is being approached. The device shall indicate at least the last two hundred (200) pounds of load. Poises shall be designed for locking in any position and to prevent unauthorized removal. The weigh beam and “tell—tale” device shall be in full view of the operator while charging the hopper, and he/she shall have convenient access to all controls.

Clearance between scale parts, hoppers, and bin structures shall be such as to avoid displacement of or friction between parts. Pivot mountings shall be designed to assure unchanging spacing of knife edges under all circumstances.

Scales shall be kept clean. The Contractor shall furnish ten (10) fifty pound (50#) weights for checking.

5. Batching:

When batches are hauled to the mixer, bulk cement shall be transported either in waterproof compartments or between the fine and coarse aggregates. When cement is placed in contact with the aggregates, batches may be rejected, unless mixed within one and one-half (1 1/2) hours of such contact. Sacked cement may be transported on top of the aggregates.

Batches shall be delivered to the mixer separate and intact. Each batch shall be dumped cleanly into the mixer without loss, and, when more than one batch is carried on the truck, without spilling of material from one batch compartment into another.

In cases where the volume of concrete to be placed is small or where, for other reasons, proportioning by batching equipment is impracticable, the materials may, with written approval, be proportioned by weighing on approved platform scales or by loose volume. The quantities shall be measured separately in an approved manner, for which purpose the Contractor will be required to use such equipment as will insure uniform proportioning. The use of approved wheelbarrows or bottomless boxes, whose volumes have been carefully predetermined, or other equally satisfactory methods may be employed. Proportioning by means of shovels will not be permitted. In determining the volumes of the aggregates, due consideration shall be given to bulking effect of any moisture contained in these materials.

Immediately before use, liquid air entraining agents shall be stirred and agitated until thoroughly mixed. The air entraining agent shall be added to the mix simultaneously with the water, except that when water heated above 80°F. is used for mixing, the air entraining agent shall be added after the aggregate and water are mixed together.

C. Mixing:

Concrete may be mixed at the construction site, at a central mixing plant, in a truck mixer or by a combination of central plant and truck mixing.

For each load, the Engineer shall be supplied a delivery ticket imprinted by an automatic time clock to indicate the actual time of loading. This shall be in conformance with AASHTO M—157—8.1.3.

1. Mixing at Site of Concrete Construction.

Concrete shall be mixed in a batch mixer of approved type and capacity for a period of not less than fifty (50) seconds after all component materials, including water, are in the drum. The charging of water into the mixer shall begin before the cement and aggregates enter the drum. During mixing, the drum shall be operated at speeds specified by the manufacturer and shown on his/her name plate on the machine. Pick-up blades in the drum of the mixer, which at any point are worn down three-quarter inch or more, must be replaced. The entire contents of the mixer shall be

discharged from the drum before materials for a succeeding batch are placed therein. The mixer shall be equipped with mechanical means for preventing the addition of aggregates after mixing has commenced.

The mixer shall be equipped with an approved timing device to insure mixing for the minimum time specified. The volume of a batch shall not exceed the manufacturer's rated capacity of the mixer. No mixer whose rated capacity is less than one (1) cubic yard shall be used, unless written permission is obtained.

The concrete shall be mixed only in such quantities as are required for immediate use. Retempering of concrete will not be allowed.

Upon cessation of mixing for any considerable length of time, the mixer shall be cleaned thoroughly. Upon resumption of mixing, the first batch of concrete material placed in the mixer shall contain sufficient sand, cement, and water to coat the inside surface of the drum without diminishing the required mortar content of the mix.

2. Central Plant Mixing:

When concrete is mixed at a central plant, the mixer and methods used shall be in accordance with the requirements of Section 501—3.02.C. 1.

Mixed concrete shall be transported from the central mixing plant to the site of work in agitator trucks of approved design. Delivery of concrete shall be so regulated that placing is at a continuous rate, unless delayed by the placing operations. The intervals between delivery of batches shall not be so great as to allow the concrete in place to harden partially, and in no case shall such an interval exceed thirty (30) minutes.

Unless otherwise permitted in writing, the agitator truck shall be equipped with a closed, watertight, revolving drum suitably mounted and shall be capable of transporting and discharging the concrete without segregation. The agitating speed of the drum shall be not less than two (2) nor more than six (6) revolutions per minute. The volume of mixed concrete permitted in the drum shall not exceed the manufacturer's rating nor exceed eighty percent (80%) of the gross volume of the drum.

Subject to approval, open—top revolving—blade truck mixers may be used in lieu of agitator trucks for transportation of central plant mixed concrete.

Gross volume of agitator bodies expressed in cubic feet shall be supplied by the mixer manufacturer.

Concrete shall be delivered to the site of the work, discharged from the truck completely and be in the forms, ready for vibration within one and one—half (1 1/2) hours after introduction of the cement to the aggregates. At the discretion of the Engineer, the above period may be extended one minute for every degree of temperature at which the concrete is delivered below 70°F. to a maximum total time of two (2) hours.

In hot weather, or under conditions contributing to quick setting of the concrete, a discharge time less than one and one-half hours may be required.

Concrete, when discharged, shall have a uniform consistency. A maximum difference of one inch between slumps of samples from the 1/4 and 3/4 points of the discharged load shall be deemed satisfactory.

All concrete, regardless of agitation time shall conform to all limitations of Table 501—1. The concrete mixture shall be agitated continuously until discharged from the truck.

3. Truck Mixing:

Concrete may be mixed in a truck mixer of approved design. Truck mixing shall be in accordance with the following provisions:

The truck mixer shall be either a closed, watertight, revolving drum or an open-top, revolving-blade or paddle type. It shall combine all ingredients into a thoroughly mixed and uniform mass and shall discharge the concrete with satisfactory uniformity. A maximum difference of one inch between slumps of samples from the 1/4 and 3/4 points of the discharged load shall be deemed satisfactory.

Mixing speed for the revolving-drum type mixer shall be not less than four (4) revolutions per minute of the drum nor greater than a speed resulting in a peripheral velocity of the drum of two hundred twenty-five feet per minute. For the open-top type mixer, mixing speed shall be not less than four (4) nor more than sixteen (16) revolutions per minute of the mixing blades or paddles.

Agitation speed for both the revolving-drum and revolving-blade type mixers shall be not less than two (2) nor more than six (6) revolutions per minute of the drum or mixing blades or paddles.

The capacities of truck mixers shall be in accordance with the manufacturer's ratings except that they shall not exceed the limitations specified herein. Normal rated capacities, expressed as percentages of the gross volume of the drum or container, shall not exceed fifty-seven and one-half percent (57 1/2%) for truck mixing, and eighty percent (80%.) for agitating.

In the case of truck mixing, a volume of concrete ten percent (10%) greater than the normal rated capacity of fifty-seven and one-half percent (57 1/2%) of the volume of the drum or container may be mixed (i.e., 63 1/4%) if adequate mixing of such increased volume is guaranteed by the manufacturer and if additional mixing is done as hereinafter specified.

The manufacturer shall attach to each truck mixer a metal plate on which are stated the capacities, in terms of volume of mixed concrete, as a mixer and as an agitator. When the manufacturer's rating of capacity are less than the limits indicated above, the manufacturer's ratings shall govern.

The amount of mixing shall be designated in number of revolutions. When the concrete is mixed in a truck mixer loaded to its normal rated capacity, the number of revolutions of the drum or blades at mixing speed shall not be less than fifty (50) nor more than one hundred (100), after all materials, including mixing water, have been

charged into the drum. If the batch is greater than normal rated capacity, but not more than ten percent (10%) greater, the number of revolutions of the drum or blades at mixing speed shall be not less than seventy (70) nor more than one hundred (100). All revolutions after 100 shall be at agitating speed.

A suitable counter shall be provided which will indicate the number of revolutions of the drum or blades. A locking device for prevention of discharge of the mixer prior to completion of the required number of drum revolutions shall be provided.

Concrete shall be delivered to the site of the work, discharged from the truck completely and be in the forms ready for vibration within one and one-half (1 1/2) hours after introduction of the cement to the aggregates. At the direction of the Engineer, the above period may be extended one (1) minute for every degree of temperature at which the concrete is delivered below 70°F. to a maximum total time of two (2) hours.

In hot weather, or under conditions contributing to quick setting of the concrete, a discharge time less than one and one-half (1 1/2) hours may be required.

All concrete, regardless of agitation time, shall conform to all limitations of Table 501—1. The concrete mixture shall be agitated continuously until discharged from the truck.

Delivery of concrete shall be so regulated that placing is at a continuous rate unless delayed by the placing operations. The intervals between delivery of batches shall not be so great as to allow the concrete in place to harden partially, and in no case shall such an interval exceed thirty (30) minutes.

When the concrete is mixed in a truck mixer, the mixing operation shall begin within thirty (30) minutes after the cement has been intermingled with the aggregates.

Except when intended for use exclusively as agitators, truck mixers shall be provided with a water—measuring device to measure accurately the quantity of water for each batch. The device may be mounted on the truck mixer or located at the point of loading the truck mixer. The tank shall be readily accessible for the determination of the amount of water delivered. The delivered amount of water shall be within a tolerance of one percent (1%) of the indicated amount when the tank, if mounted on the truck mixer, is stationary and practically level.

When wash water (Flush water) is used as a portion of the mixing water for the succeeding batch, it shall be accurately measured and taken into account in determining the amount of additional mixing water required. When wash water is carried on the truck mixer, it shall be carried in a compartment separate from that used for carrying or measuring the mixing water. The Engineer will specify the amount of wash or flush water, when permissible, and may specify a “dry” drum if wash water is used without measurement or without supervision.

Properly calibrated combination materials transporter/mobile concrete mixing plants in good mechanical condition may be used, subject to approval. Manufacturer’s handbooks for the particular combination materials transporter/mobile concrete mixing plant will be based on the capability of the machine to consistently produce specification concrete in conformance with the manufacturer’s published criteria.

4. Hand Mixing:

Hand mixing will not be permitted except in case of emergency and with written permission. When permitted, it shall be performed only on watertight platforms. The proper amount of coarse aggregate shall be measured in measuring boxes and spread on the platform and the fine aggregate shall be spread on this layer, the two (2) layers being not more than one foot in total depth. On this mixture shall be spread the dry cement and the whole mass turned not less than two (2) times dry; then sufficient clean water shall be added, evenly distributed, and the entire mass turned and returned at least six (6) times and until all particles of the coarse aggregate are covered thoroughly with mortar, and the mixture is of a uniform color and general appearance. Hand—mixed batches shall not exceed one—half cubic yard (1/2 C.Y.) in volume. Hand—mixing will not be permitted for concrete that is to be placed under water.

D. Cold Weather Concrete:

Concrete shall not be placed when the descending air temperature in the shade, away from artificial heat, falls below 40°F. nor resumed before the ascending air temperature reaches 35°F., without specific written authorization. When the air temperature falls below 40°F., or is, in the opinion of the Engineer, likely to occur within a twenty—four (24) hour period after placing concrete, the Contractor shall have ready on the job, materials and equipment required to heat mixing water and aggregate and to protect freshly placed concrete from freezing.

1. Temperature of Concrete:

Concrete placed at air temperatures below 40°F. shall have a temperature not less than 50°F. nor greater than 70°F. when placed in the forms. These temperatures shall be obtained by heating the mixing water and/or aggregate. Mixing water shall not be heated to more than 160°F. Aggregate shall be heated as provided in Section 501—3.02.B.

When the temperature of either the water or aggregate exceeds 100°F., they shall be mixed together so that the temperature of the mix does not exceed 80°F. at the time the cement is added.

2. Admixtures:

The use of chemicals or other foreign materials to lower the freezing point or accelerate hardening of the concrete is prohibited.

3. Cold Weather Placement:

When placing concrete in cold weather, the following precautions shall be taken in addition to the above requirements:

Heat shall be applied to forms and reinforcing steel before placing concrete as required to remove all frost, ice, and snow from all surfaces which will be in contact with fresh concrete.

When fresh concrete is to be placed in contact with hardened concrete, the surface of the previous pour shall be warmed to at least 35°F., thoroughly wet, and free water removed before fresh concrete is placed.

4. Protection of Concrete:

Freshly placed concrete shall be maintained at a temperature of not less than 70°F., for three (3) days or not less than 50°F. for five (5) days, when Type I or II cement is used, and not less than 70°F. for two (2) days or not less than 50°F. for three (3) days, when Type III cement is used. The above requirements are not intended to apply during the normal summer construction when air temperatures of 40°F. or higher can reasonably be anticipated during the two—week period immediately following concrete placement, or until the concrete is no longer in danger from freezing.

When temperatures below 20°F. are not expected during the curing period and, in the opinion of the Engineer, no other adverse conditions, such as high winds, are expected, concrete temperatures may be maintained in thick concrete sections by retention of heat of hydration by means of adequately insulated forms.

When, in the opinion of the Engineer, greater protection is required to maintain the specified temperature, the fresh concrete shall be completely enclosed and an adequate heat source provided. Such enclosure and heat source shall be so designed that evaporation of moisture from the concrete during curing is prevented. Precautions shall be taken to protect the structure from overheating and fire.

At the end of the required curing period protection may be removed, but in such a manner that the drop in temperature of any portion of the concrete will be gradual and not exceed 30°F. in the first twenty—four (24) hours.

For concrete placed within cofferdams and cured by flooding with water, the above conditions may be waived provided that the water in contact with the concrete is not permitted to freeze. Dewatering shall not be carried out until the Engineer determines that the concrete has cured sufficiently to withstand freezing temperatures and hydrostatic pressure.

The Contractor shall be wholly responsible for the protection of the concrete during cold weather operations and any concrete injured by frost action or overheating shall be removed and replaced at his/her expense.

E. Forms:

Forms shall be so designed and constructed that they may be removed without injuring the concrete.

Unless otherwise specified, forms for exposed surfaces shall be made of plywood, hard—pressed fiberboard, sized and dressed tongue—and—groove lumber, or metal in which all bolt and rivet holes are countersunk, so that a plane, smooth surface of the desired contour is obtained. Rough lumber may be used for surfaces that will not be exposed in the finished structure. All lumber shall be free from knot holes, loose knots, cracks, splits, warps, or other defects affecting the strength or appearance of the finished structure. All forms shall be mortar tight, free of bulge and warp, and shall be cleaned thoroughly before reuse.

Where surfaces are to be exposed or painted, panels shall be manufacturers stock size material, using smaller panels cut to required dimensions only where required by openings and joints. Panel joints in exposed or painted work shall occur at control joints, including alignment with masonry control joints and construction joints.

On retaining walls, exposed corners shall be chamfered, beveled, or rounded by moldings placed in the forms. An arrestification groove shall be placed every ten feet, at seams in the form material, or as directed by the Engineer.

In designing forms and falsework, concrete shall be regarded as a liquid. In computing vertical loads a weight of one hundred fifty (150) pounds per cubic foot shall be assumed. The lateral pressure for design of wall forms shall not be less than that given by the following formulas:

1. For walls with R not exceeding seven feet per hour:

$$p = 150 + \frac{9000R}{T}, \text{ but not more than } 2000 \text{ p.s.f. or } 150 \text{ h, whichever is less.}$$

2. For walls with R greater than seven feet per hour:

$$P = 150 + \frac{43,400}{T} + \frac{2800R}{T}, \text{ but not more than } 2000 \text{ p.s.f. or } 150 \text{ h, whichever is less.}$$

where:

- P = lateral pressure for design of wall forms, p.s.f.
- R = rate of placement, feet per hour
- T = temperature of concrete in form, °F.
- h = maximum height of fresh concrete in form, feet

The above formulas apply to internally vibrated concrete placed at ten feet per hour or less and where depth of vibration is limited to four feet below the top of the concrete surface. The Contractor shall state the placement rate and minimum concrete temperature on the working drawings for concrete temperature on the working drawings for concrete form work. Deflection of plywood, studs, and walers shall not exceed 1/360 of the span between supports.

Forms shall be so designed that placement and finishing of the concrete will not impose loads on the structure resulting in adverse deflections or distortions.

The forms shall be so designed that portions covering concrete that is required to be finished may be removed without disturbing other portions that are to be removed later. As far as practicable, form marks shall conform to the general lines of the structure.

When possible, forms shall be daylighted at intervals not greater than ten feet vertically, the openings being sufficient to permit free access to the forms for the purpose of inspecting and working.

Metal ties or anchorages within the forms shall be so constructed as to permit their removal to a depth of at least one inch from the face without injury to the concrete. All fittings for metal ties shall be of such design that, upon their removal, the cavities which are left will be of the smallest possible size.

All exposed edges ninety degrees (90°), or sharper, shall be chamfered three—quarter inch unless otherwise noted. Chamfering of forms for re—entrant angles shall be required only when specifically indicated on the plans.

Forms shall be inspected immediately prior to the placing of concrete. Dimensions shall be checked carefully and any bulging or warping shall be remedied and all debris within the forms shall be removed. Special attention shall be paid to ties and bracing where forms appear to be braced insufficiently or built unsatisfactorily, either before or during placing of the concrete, the Engineer shall order the work stopped until the defects have been corrected.

Forms shall be constructed true to line and grade. Clean—out ports shall be provided at construction joints.

The construction of concrete bridge decks with permanent steel bridge deck forms shall conform to the requirements of this specification and as shown on the plans. Removable forms may be substituted for permanent metal forms with no adjustment in prices.

Permanent metal forms shall not be used to form those portions of the bridge deck slab cantilevered beyond the exterior faces of the fascia girders.

All forms shall be installed in accordance with approved fabrication and erection plans.

Form sheets shall not be permitted to rest directly on the top of the stringer or floor beam flanges. Sheets shall be securely fastened to form supports and shall have a minimum bearing in length of one inch at each end. Form supports shall be placed in direct contact with the flange or stringer or floor beam. All attachments shall be made by permissible welds, bolts, clips or other approved means. Welding will not be permitted on the top flanges of any steel girder sections subject to tensile stresses or stress reversals, or to flanges made of quenched and tempered steel.

All porous forms shall be treated with non—staining form oil or saturated with water immediately before placing concrete.

Falsework shall be built to carry the loads without appreciable settlement. Falsework that cannot be founded on solid footings must be supported by ample falsework piling. Falsework shall be designed to sustain all imposed loads.

Detail drawings of the falsework shall be submitted for review, but such review shall not relieve the Contractor of any of his/her responsibility under the contract for the successful completion of the structure.

Forms and falsework shall not be removed without the consent of the Engineer. The Engineer's consent shall not relieve the Contractor of responsibility for the safety of the work. Blocks and bracing shall be removed at the time the forms are removed and in no case shall any portion of the wood forms be left in the concrete.

To facilitate finishing, forms used on ornamental work, railings, parapets, and exposed vertical surfaces shall be removed in not less than twelve (12) nor more than forty—eight (48) hours, depending upon weather conditions. The side forms for arch rings, columns, and piers shall be removed before the member of the structure which they support are placed, so that the quality of the concrete may be inspected. All such side forms shall be removed before the removal of shoring from beneath beams and girders.

In warm weather, falsework and forms shall remain in place under slabs, beams, girders and arches for fourteen (14) days after the day of last pour when Type I or Type II cement is used, or for seven (7) days when Type III cement is used. Forms for slabs having clear spans or cantilever spans of less than ten feet may be removed after seven days (7) days when Type I or Type II cement is used, or after four (4) days when Type III cement is used. In cold weather, the length of time that forms and falsework are to remain in place shall be as approved.

Falsework supporting the deck of rigid frame structures shall not be removed until fills have been placed behind the vertical legs.

No superstructure load shall be placed upon finished bents, piers, or abutments until the Engineer so directs, but the minimum time allowed for the curing of structural concrete in the substructure before any load of the superstructure is placed thereon shall be seven (7) days when Type I or Type II cement is used and two (2) days when Type III cement is use.

F. Placing Concrete:

1. General. All concrete shall be placed before it has taken its initial set and, in any case, within thirty minutes after mixing, except as otherwise permitted in Section 501—3.02.C. Concrete shall be placed in such manner as to avoid segregation of coarse or fine portions of mixture, and shall be spread in horizontal layers when practicable. Special care shall be exercised in the bottom of slabs and girders to assure the working of the concrete around nests of reinforcing steel, so as to eliminate rock pockets or air bubbles. Enough rods, spades, tampers and vibrators shall be provided to compact each batch before the succeeding one is dumped and to prevent the formation of joints between batches. Extra vibrating shall be done along all faces to obtain smooth surfaces. Care shall be taken to prevent mortar from splattering on forms and reinforcing steel and from drying ahead of the final covering with concrete.

Concrete shall not be placed in decks, sidewalks, curbs and gutters, or other sections requiring finishing on the top surface when precipitation is occurring or when, in the opinion of the Engineer, precipitation is likely before completion of the finishing, unless the Contractor shall have ready on the job all materials and equipment necessary to protect the concrete and allow finishing operations to be completed.

Troughs, pipes, or short chutes used as aids in placing concrete shall be arranged and used in such a manner that the ingredients of the concrete do not become separated. Where steep slopes are required, troughs and chutes shall be equipped with baffle boards or shall be in short lengths that reverse direction of movement. All chutes, troughs, and pipe shall be kept clean and free of hardened concrete by flushing thoroughly with water after each run. Water used for flushing shall be discharged clear of the concrete in place. Troughs and chutes shall be of steel or plastic or shall be lined with steel or plastic and shall extend as nearly as possible in the point of deposit. The use of aluminum pipes, chutes or tremies is prohibited. When discharge must be intermittent, a hopper or other device for regulating the discharge shall be provided.

Dropping the concrete a distance of more than five feet or depositing a large quantity at any point and running or working it along the forms will not be permitted, except that concrete for filling piles may be discharged directly into the pile. The placing of concrete shall be so regulated that the pressures caused by wet concrete shall not exceed those used in the design of the forms.

High frequency internal vibrators of either the pneumatic, electrical, or hydraulic type shall be used for compacting concrete in all structures. The number of vibrators used shall be ample to consolidate the fresh concrete within fifteen (15) minutes of placing in the forms. In all cases, the Contractor shall provide at least two (2) concrete vibrators for each individual placement operation (one may be a standby), which shall conform to the requirements of these specifications. Prior to the placement of any concrete, the Contractor shall demonstrate that the two (2) vibrators are in good working order and repair and are ready for use.

The vibrators shall be an approved type, with a minimum frequency of 5,000 cycles per minute and shall be capable of visibly affecting a properly designed mixture with a one inch slump for a distance of at least eighteen inches from the vibrator.

Vibrators shall not be held against forms or reinforcing steel nor shall they be used for flowing the concrete or spreading it into place. Vibrators shall be so manipulated as to produce concrete that is free of voids, is of proper texture on exposed faces, and of maximum consolidation. Vibrators shall not be held so long in one place as to result in segregation of concrete or formation of laitance on the surface.

Concrete shall be placed continuously throughout each section of the structure or between indicated joints. If, in an emergency, it necessary to stop placing concrete before a section is completed, bulkheads shall be placed as the Engineer may direct and the resulting joint shall be treated as a construction joint.

The presence of areas of excessive honeycomb may be considered sufficient cause for rejection of a structure. Upon written notice that a given structure has been rejected, the Contractor shall remove and rebuild the structure, in part or wholly as specified, at his/her own expense.

2. Pumping Concrete. Concrete may be placed by pumping provided the Contractor demonstrates that the pumping equipment to be used will effectively handle the particular class of concrete with the slump and air content specified and that it is so arranged that no vibrations result that might damage freshly placed concrete. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. After this operation, the entire equipment shall be thoroughly cleaned. Slump tests shall be taken at the discharge end of the pipe.
3. Concrete Columns. Concrete in columns shall be placed in one continuous operation unless otherwise permitted. The concrete shall be allowed to set at least twelve (12) hours before caps are placed.
4. Concrete Slab and Girder Spans. Slabs and girders having spans of thirty feet or less shall be cast in one continuous operation.

Girders spanning more than thirty feet may be cast in two (2) operations, the first operation being the casting of the girder stems to the bottom of the slab haunches. Shear keys shall be provided by by inserting oiled timber blocks to a depth of at least one and one—half inches in the fresh concrete at the top of each girder stem. A sufficient number of blocks shall be used to cover uniformly about one—half the top surface of the girder stem and the blocks shall be removed as soon as the concrete has set sufficiently to retain their shape. The period between the first and the second casting shall be at least twenty—four (24) hours. Immediately before the second casting, the Contractor shall check all falsework for shrinkage and settlement and shall tighten all wedges to insure minimum deflection of the stems due to the added weight of the slab.

5. Deck Slabs on Steel Spans. The concrete deck slab on simple steel girder spans may be placed in not more than three (3) sections with the first section centered on the span.

On truss spans or continuous girder bridges, the concrete deck slab shall be placed as shown on the plans or as directed.

Subject to approval and the following conditions, the Contractor will be permitted to deviate from the deck placing sequence shown on the plans by casting the bridge deck continuously from one end to the other:

- a. The Contractor will not be permitted to use Type III cement for a continuous deck placement operation.
- b. The Contractor shall submit, for approval, his/her written proposal of the methods and means, equipment, personnel and time schedule he/she intends to employ in conducting a continuous deck placement and finishing operation.
- c. All materials necessary to complete the placement shall be stockpiled and the Contractor shall have all equipment, incidentals and personnel available on the site prior to beginning a continuous deck placement operation.
- d. Any continuous deck placement and finishing operation shall be capable of proceeding at a minimum rate of thirty feet per hour, measured longitudinally along the axis of the bridge.

Any continuous deck placement operation shall begin at one end of the bridge.

If the Engineer approved the Contractor's proposal for a continuous deck placement operation, the Owner reserves the right to observe and evaluate the Contractor's performance to the first planned construction joint in the sequence, at which point the Engineer may authorize the Contractor to suspend the placement and install a bulkhead. The Engineer's decision will be based primarily on the Contractor's ability to produce, deliver and finish deck concrete acceptable in accordance with the specifications, all at a continuous rate that will permit the structure to accommodate final dead load deflections while the concrete is plastic.

Should the Engineer order the Contractor to suspend his/her continuous deck placement operations after the first sequential pour placement, the Contractor shall submit all significant modifications for improving his/her continuous

deck placement operations, beginning again at the other end of the bridge, and will be permitted to demonstrate his/her raised method as specified above for the initial placement.

If the Engineer suspends the Contractor's continuous deck placement operation after the second attempt, the Contractor shall abandon the method and follow the deck placing sequence shown on the plans.

6. Concrete Deposited Under Water. If conditions render it impossible or inadvisable in the opinion of the Engineer to dewater excavations before placing concrete, the Contractor shall deposit under water, by means of a tremie or pump, a seal course of concrete of sufficient thickness to thoroughly seal the cofferdam. The concrete shall be carefully placed in a compact mass and shall not be disturbed after being deposited. Still water shall be maintained at the point of deposit.

A tremie shall consist of a watertight tube having a diameter of not less than ten inches with a hopper at the top. When a batch is dumped into the hopper, the flow of concrete shall be induced by slightly raising the discharge end, always keeping it in the deposited concrete.

Tremie tubes or pump discharge tubes used to deposit concrete under water shall be equipped with a device that will prevent water from entering the tube while charging the tube with concrete. Such tubes shall be supported so as to permit free movements of the discharge end over the entire top surface of the work and to permit rapid lowering, when necessary to retard or stop the flow of concrete. The tubes shall be filled by a method that will prevent washing of the concrete. The discharge end shall be completely submerged in concrete at all times and the tube shall contain sufficient concrete to prevent any water entry. The flow shall be continuous until the work is completed and the resulting concrete seal shall be monolithic and homogeneous.

The exact thickness of the seal will depend upon the hydrostatic head, bond and spacing of piles, size of cofferdam, and other related factors, but in no case shall the seal be less than two feet in thickness, unless otherwise shown on the plans. Before dewatering, the concrete in the seal shall be allowed to cure for not less than five (5) days after placing, or the seal concrete has achieved a minimum compressive strength of 2,500 psi based on test cylinders cured under the same conditions as the in situ concrete, whichever occurs first.

If a seal which is to withstand hydrostatic pressure is placed in water having a temperature below 45°F., the curing time before dewatering shall be increased as directed.

Periods of time during which the temperature of the water has been continuously below 38°F. shall not be considered as curing time. After sufficient time has elapsed to insure adequate strength in the concrete seal, the cofferdam shall be dewatered and the top of the concrete cleaned of all scum, laitance and sediment. Before fresh concrete is deposited, local high spots shall be removed as necessary to provide proper clearance for reinforcing steel.

7. Forming Construction Joints. Construction joints shall be located where shown on the plans or as permitted. Construction joints shall be perpendicular to the principal lines of stress and in general shall be located at points of minimum shear.

At horizontal construction joints, gage strips one and one-half inches thick shall be placed inside the forms along all exposed faces to give the joints straight lines. Before placing fresh concrete, the surfaces of construction joints shall be washed and scrubbed with a wire broom, drenched with water until saturated, and kept saturated until the new concrete is placed. Immediately prior to placing new concrete, the forms shall be drawn tight against the concrete already in place and the old surface shall be coated thoroughly with a very thin coating of neat cement mortar. Concrete in substructures shall be placed in such manner that all horizontal construction joints will be truly horizontal and, if possible, in locations such that they will not be exposed to view in the finished structure. Where vertical construction joints are necessary, reinforcing bars shall extend across the joint in such a manner as to make the structure monolithic. Special care shall be taken to avoid construction joints through paneled wing-walls or other large surfaces which are to be treated architecturally.

All construction joints shall be provided with concrete shear keys a least one and one-half inches deep and one-third of the concrete thickness in width, unless otherwise shown on the plans.

8. Installation of Expansion Joints. Expansion joints shall be located and formed as required on the plans.
 - a. Open Joints. Open joints shall be placed in the location shown on the plans and shall be formed. The form shall be removed without chipping or breaking the corners of the concrete. Reinforcement shall not extend across an open joint, unless so specified on the plans.
 - b. Filled Joints. Unless other wise shown on the plans, expansion joints shall be constructed with premolded expansion joint filler with a thickness equal to the width of the joint.

The joint filler shall be cut to the same shape and size as the adjoining surfaces. It shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

Immediately after the forms are removed, the expansion joints shall be inspected carefully. Any concrete or mortar that has sealed across the joint shall be removed.

Joint sealer for use in deck joints shall be of the type shown on the plans conforming to the requirements of Section 705. The faces of all joints to be sealed shall be free of foreign matter, paint, curing compound, oils, greases, dirt, free water, and laitance.

- c. Elastomeric Compression Seals. The joint seal shall be shaped as shown on the plans. It shall be installed by suitable hand or machine tools and thoroughly secured in place with a lubricant—adhesive recommended by the seal manufacturer. The lubricant—adhesive shall cover both sides of the seal over the full area in contact with the sides of the joint.

The seal shall be in one piece for the full width of the roadway joint. Any joints at curbs shall be sealed adequately with additional adhesive.

The seal may be installed immediately after the curing period of the concrete deck slab. Temperature limitations of the lubricant—adhesive as specified by the manufacturer shall be observed.

- d. Strip Seals. Expansion joint strip seals shall be as shown on the plans, and composed of a steel extrusion and an extruded strip seal. The steel shall conform to ASTM A242 or A588. The seal shall be manufactured of material conforming to the requirements of Section 705. Strip seals shall be one—piece for the length of the joint.

Installation of the expansion joints shall be in accordance with the manufacturer's recommendations, except that the joint opening shall be adjusted for the dimensions indicated on the plans.

- e. Steel Joints. The plates, angles, or other structural shapes shall be accurately shaped at the shop to conform to the section of the concrete deck. The fabrication and painting shall conform to the requirements of the specifications covering those items. Care shall be taken to insure that the surface in the finished plane is true and free of warping. Positive methods shall be employed in placing the joints to keep them in correct position during the placing of the concrete. The opening at expansion joints shall be that designated on the plans at normal temperature.

9. Placing Anchor Bolts. Anchor bolt assemblies conforming to the details shown shall be accurately secured in the forms in the positions shown on the plans, before any concrete is placed in the forms. The positions shall be checked and any adjustments made as soon as the concrete has been placed.

When pipe sleeves or pre—cast holes are provided, no water shall be allowed to freeze in the cavity. When anchor bolts are installed in pipe sleeves or pre—cast holes, the cavity shall be completely filled with grout at the time the grout pads are constructed or at the time the bearing assemblies or masonry plates are placed.

10. Setting Shoes and Bearing Plates. Bridge seat bearing areas shall preferably be finished high and rubbed to grade.
11. Drainage Holes and Weep Holes. Drainage holes and weep holes shall be constructed as indicated on the plans or as required.

Weep holes through concrete shall be formed. If wooden forms are used, they shall be removed after the concrete is cured. If subsurface drainage is not shown on the plans, weep holes shall be provided in retaining walls and abutment walls where the height of the wall is over five feet measured from the top to the footing. Weep holes shall be four inches in diameter and shall be spaced not more than fifteen feet apart. The outlet end of weep holes shall be placed just above the finish ground line at the face of wall, or as directed.

12. Pipes, Conduits, and Ducts. Pipes, conduits, and ducts that are to be encased in concrete shall be installed in the forms by the Contractor before the concrete is placed. Unless otherwise indicated, pipes embedded in concrete shall be of standard, lightweight cast—iron water pipe or of wrought iron. The pipe shall be held rigidly, so that it will not be displaced during the placing of the concrete.

13. Foundations. Preparation of foundations shall conform to the requirements in Section 206.
14. Bridge Decks on Permanent Metal Forms. Concrete shall be placed in accordance with the contract specifications. Particular emphasis should be placed on proper vibration of the concrete to avoid honeycomb and voids, especially at construction joints, expansion joints, and valleys and ends of form sheets.

The Contractor's method of construction will be carefully observed during all phases of the construction of the bridge deck slab. These phases include installations of the metal forms; location and fastening of the reinforcement; composition of concrete items; mixing procedures, concrete placement and vibration; and finishing of the bridge deck. Should the Engineer determine that the procedures used during the placement of the concrete warrant inspection of the underside of the deck, the Contractor shall remove at least one section of the forms at a location and time selected by the Engineer of each span in the contract. This should be done as soon after placing the concrete as practicable in order to provide visual evidence that the concrete mix and the Contractor's procedures are obtaining the desired results. An additional section shall be removed if the Engineer determines that there has been any change in the concrete mix or in the Contractor's procedures warranting additional inspection.

After the deck has been in place for a minimum period of two days, the concrete shall be tested for soundness and bonding of the forms by sounding with a hammer as directed. If areas of doubtful soundness are disclosed by this procedure, the Contractor will be required to remove the forms from such areas for visual inspection after the concrete has attained adequate strength. This removal of the permanent steel bridge deck forms shall be at no cost to the State.

At locations where sections of the forms are removed, the Contractor will not be required to replace the forms, but the adjacent metal forms and supports shall be repaired to present a neat appearance and assure their satisfactory retention. As soon as the form is removed, the concrete surfaces will be examined for cavities, honeycombing and other defects. If irregularities are found, and it is determined that these irregularities do not justify rejection of the work, the concrete shall be prepared as directed and shall be given an Ordinary Surface Finish, in accordance with the contract specifications. If the concrete where the form is removed is unsatisfactory, additional forms, as necessary, shall be removed to inspect and repair the slab, and the Contractor's methods of construction shall be modified as required to obtain satisfactory concrete in the slab.

All unsatisfactory concrete shall be removed or repaired as directed. The amount of sounding and form removal may be moderated, at the Engineer's discretion, after a substantial amount of slab has been constructed and inspected, if the Contractor's methods of construction and the results of the inspection as outlined above indicate that sound concrete is being obtained throughout the slabs.

The Contractor shall provide all facilities as are reasonably required for the safe and convenient conduct of the Engineer's inspection procedures.

15. Polymer—Modified Concrete for Bridge Deck Protection.
 - a. Surface Preparation. Surfaces to receive polymer—modified concrete bridge

deck protection shall be clean and free of any oil, grease, dirt or other contaminants which would inhibit bonding of the polymer—modified overlay to the lower concrete course. Such surfaces shall be blast cleaned.

The surface shall be damp as the overlay is placed, but the surface shall be free of standing water. Preferably the surfaces should be hosed down and excess water removed by compressed air immediately prior to placing the overlay.

- b. Finishing. After the polymer—modified concrete has been placed and consolidated, the surface of the overlay shall be carefully struck off by means of a vibrating finishing machine operating on rails. A uniform deck surface true to the required grade and cross section shall be obtained.

When a tight uniform surface has been achieved, it shall be textured to provide a gritty surface for maximum traction. The texturizing shall be done before the plastic film forms on the surface, which occurs in approximately twenty—five minutes during hot, dry weather.

- c. Curing. The placement shall be covered with a single layer of clean, wet burlap. Care shall be exercised to insure that the burlap is well drained and is placed as soon as the surface will support it without deformation. It is the nature of the polymer—modifier to form a plastic film at the surface upon drying, usually within twenty—five minutes in hot, dry weather, and this film shall be protected against shrinkage cracking by prompt covering with wet burlap.

A second layer of wet burlap shall be placed on the first approximately one hour later and the entire covering maintained in a set condition for twenty—four hours, after which time all coverings shall be removed.

In—lieu—of the second layer of wet burlap and subsequent continuous wetting, a layer of polyethylene film may be placed on the first wet layer for the required twenty—four hour period and then removed. Curing methods other than those specified will not be permitted.

- d. Opening to Traffic. No vehicle shall be allowed on the overlay for a period of ninety—six hours after placement when the mean ambient air temperature is greater than 60°F or for a period of one hundred twenty hours when the mean ambient air temperature is less than 60°F., unless the overlay has achieved a minimum compressive strength of 3,000 psi.

G. Finishing Concrete Surfaces:

All concrete surfaces exposed in the completed work shall comply with the requirements of 1. below, except as provided below, or as otherwise noted on the plans or in the special provisions.

1. Ordinary Finish. An Ordinary Finish is defined as the finish left on a surface after the removal of the forms, the filling of all holes left by form ties, and the repairing of all defects. The surface shall be true and even, free from stone pockets and depressions or projections. All surfaces that cannot be satisfactorily repaired, shall be given a Rubbed Finish.

The concrete in caps and tops of wall shall be struck off with a straight—edge and floated to true grade. The use of mortar topping for concrete surfaces shall in no case be permitted.

As soon as the forms are removed, metal devices that have been used for holding the forms in place, and which pass through the body of the concrete, shall be removed or cut back at least one inch beneath the surface of the concrete. Fins of mortar and all irregularities caused by form joints shall be removed.

All small holes, depressions, and voids, that show upon the removal of forms, shall be filled with cement mortar mixed in the same proportions as that used in the body of the work. In patching larger holes and honeycombs, all coarse or broken material shall be chipped away until a dense uniform surface of concrete exposing solid coarse aggregate is obtained. Feathered edges shall be cut away to form faces perpendicular to the surface. All surfaces of the cavity shall be saturated thoroughly with water, after which a thin layer of neat cement mortar shall be applied. The cavity shall then be filled with stiff mortar composed of one part of Portland cement to two parts of sand, which shall be thoroughly tamped into place. The mortar shall be preshrunk by mixing it approximately twenty minutes before using. The length of time may be varied in accordance with brand of cement used, temperature, humidity, and other local conditions. The surface of this mortar shall be floated with a wooden float before initial set takes place and shall be neat in appearance. The patch shall be kept wet for a period of five days.

For patching large or deep areas, coarse aggregate shall be added to the patching material. All mortar for patching on surfaces which will be exposed to view in the completed structure shall be color matched to the concrete. Test patches for color matching shall be conducted on concrete that will be hidden from view in the completed work and shall be subject to approval.

2. Rubbed Finish:

When forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities and form marks are removed and the surface is covered with a lather composed of cement and water. If permitted, a thin grout composed of one part cement and one part fine sand may be used in the rubbing. This lather shall be allowed to set for at least five days. The surface shall then be smoothed by being rubbed lightly with a fine carborundum stone.

If the concrete has hardened before being rubbed, a medium coarse carborundum stone shall be used to finish the surface. Such work shall not be done until at least four days after placing and it shall be done in the following manner. A thin grout composed of one part cement and one part fine sand shall be spread over a small area of the surface and rubbed immediately with the stone until all form marks and irregularities are removed and the surface is covered with a lather after which the surface shall be finished as described above for green concrete.

The surface shall be smooth in texture and uniform in appearance. The building up of depressions will not be permitted.

If, through the use of first—class form materials and the exercise of special care, concrete surfaces are obtained that are satisfactory, the Contractor may be relieved entirely or in part from the requirement for rubbing.

3. Concrete Decks. A smooth riding surface of uniform texture, true to the required grade and cross section shall be obtained on all bridge roadway decks. The Contractor may use hand tools, or finishing machines or a combination of both, conforming to the requirements specified herein for finishing bridge roadway deck concrete.

Finishing of concrete placed in bridge decks shall consist essentially of striking off the surface of the concrete as placed and floating with longitudinal floats the surface so struck off.

The placing of concrete in bridge roadway decks will not be permitted until the Engineer is satisfied that the rate of producing and placing concrete will be sufficient to complete the proposed placing and finishing operations within the scheduled time, that experienced finishing machine operators and concrete finisher are employed to finish the deck, and all necessary finishing tools and equipment are on hand at the site of the work and in satisfactory condition for use.

Finishing machines shall be set up sufficiently in advance of use to permit inspection during the daylight hours before each placement. Before any fresh concrete is deposited on the deck, the finishing machine shall be moved on its rails across the length of the scheduled placement and the clearance between the strikeoff and deck reinforcing steel shall be checked to ensure that the required minimum concrete cover will be maintained with due consideration for deflections.

Unless adequate lighting facilities are provided by the Contractor, the placing of concrete in bridge decks shall cease at such time that finishing operations can be completed during daylight hours.

Rails for support and operation of finishing machines and headers for hand—operated strike off devices shall be completely in place and firmly secured for the scheduled length of concrete placement before placing of concrete will be permitted. Rails for finishing machines shall extend beyond both ends of the scheduled length of concrete placement a sufficient distance that will permit the float of the finishing machine to fully clear the concrete to be placed. Rails or headers shall be adjustable for elevation and shall be set to elevations with allowance for anticipated settlement, camber, and deflection of falsework, as required to obtain a bridge roadway deck true to the required grade and cross section. Rails or header shall be of a type; and shall be so installed that no springing or deflection will occur under the weight of the finishing equipment, and shall be so located that finishing equipment may operate without interruption over the entire bridge roadway deck being finished.

Details for supporting finishing machine rails shall be submitted and must be approved before any deck slab concrete is placed.

The rate of placing concrete shall be limited to that which can be finished before the beginning of initial set, except that concrete for the deck surface shall not be placed more than ten feet ahead of strike off.

After the concrete has been placed and consolidated, the surface of the concrete shall be carefully struck off by means of a hand—operated strike board operating on headers, or by a finishing machine operating on rails. A uniform deck surface true to the required grade and cross section shall be obtained.

Following strike off, the surface of the concrete shall be floated longitudinally. In the event strike off is performed by means of a hand—operated strike board, two (2) separate hand—operated float boards for longitudinal floating shall be provided. The first float shall be placed in operation as soon as the condition of the concrete will permit, and the second float shall be operated as far back of the first float as the workability of the concrete will permit.

In the event the strike off is performed with a finishing machine, longitudinal floating of the concrete shall be performed by means of a hand—operated float board or a finishing machine equipped with a longitudinal float. The longitudinal float on the finishing machine shall have a length of not less than eight feet nor more than twelve feet.

Any finishing machine having a wheel base six feet or less used for strike off shall be followed by two (2) separate hand-operated float boards for longitudinal floating. All the provisions in this section pertaining to hand—operated float boards shall apply to the two separate float boards for longitudinal floating.

Longitudinal floats, either hand—operated or machine—operated, shall be used with the long axis of the float parallel to the centerline of the bridge roadway. The float shall be operated with a combined longitudinal and transverse motion planing off the high areas and floating the material removed into the low areas. Each pass of the float shall lap the previous pass by one—half the length of the float.

Floating shall be continued until a smooth riding surface is obtained. The driving surface of the concrete shall have a heavy broom finish. Decks to receive waterproof membranes shall be float finished.

Hand-operated float boards shall be from twelve feet to sixteen feet long, ribbed and trussed as necessary to provide a rigid float and shall be equipped with adjustable handles at each end. The float shall be wood, not less than one inch thick and from four inches to eight inches wide. Adjusting screws spaced at not to exceed twenty—four inches on centers shall be provided between the float and the rib. The float board shall be true and free of twist.

Hand—operated float boards shall be operated from transverse finishing bridges. The finishing bridges shall span completely the roadway area being floated and a sufficient number of finishing bridges shall be provided to permit operation of the floats without undue delay. Not less than two transverse finishing bridges shall be provided when hand—operated float boards are used. When a finishing machine is used for longitudinal floating, one finishing bridge equivalent to the transverse finishing bridge specified herein shall be furnished for use by the Engineer.

All finishing bridges shall be of rigid construction.

Immediately following completion of the deck finishing operations, the concrete in the deck shall be cured as specified in Section 501—3.02.H.

The finished surface of the concrete shall be tested by means of a straight—edge ten feet long. The surface shall not vary more than 0.01 foot from the lower edge of the straight—edge, except bridge decks receiving asphalt wearing courses shall not vary more than 0.02 foot from the lower edge of the straight—edge. All high areas in the hardened surface in excess of 0.01 foot as indicated by testing shall be removed by

abrasive means. After grinding by abrasive means has been performed, the surface of the concrete shall not be smooth or polished. Ground areas shall be of uniform texture and shall present neat and approximately rectangular patterns.

Devices for supporting finishing machine rails shall be of such design that those portions which are to remain embedded in the concrete deck will be covered by a minimum of two inches of concrete when finishing is completed.

4. Curb and Sidewalk Surfaces. Exposed faces of curbs and sidewalks shall be finished to true surfaces. Concrete shall be worked until coarse aggregate is forced down into the body of the concrete and a layer of mortar approximately one—quarter inch thick is flushed on the top. The surface shall then be floated to a smooth but not slippery finish. The surface shall then be roughed to a medium broom finish. All finishing shall be accomplished during daylight hours. Adding water to any surface is prohibited.

H. Curing Concrete:

1. Water Curing. All concrete surfaces shall be kept wet for at least seven (7) days after placing if Type I or II cement has been used or for three (3) days if Type III cement has been used. Concrete shall be covered with wet burlap, cotton mats, or other materials meeting the requirements of Section 711, immediately after final finishing of the surface. These materials shall remain in place for the full curing period, or they may be removed when the concrete has hardened sufficiently to prevent marring and the surface immediately covered with sand, earth, straw, or similar materials.

In either case, the materials shall be kept thoroughly wet for the entire curing period. All other surfaces, if not protected by forms, shall be kept thoroughly wet, either by sprinkling or by the use of wet burlap, cotton mats, or other suitable fabric, until the end of the curing period. If wood forms are allowed to remain in place during the curing period, they shall be kept moist at all times to prevent opening at joints.

2. Membrane Curing. Liquid membrane curing compound meeting the requirements of Section 711 may be permitted, subject to approval. All finishing concrete surfaces shall be performed to the satisfaction of the Engineer prior to applying the impervious membrane curing compound. The concrete surfaces must be kept wet with water continuously until the membrane has been applied. The manufacturer's instructions shall be carefully followed in applying the membrane and in all cases, membrane curing compound must always be thoroughly mixed immediately before application. In case the membrane becomes marred, worn, or in any way damaged, it must immediately be repaired by wetting the damaged area thoroughly and applying a new coat of the impervious membrane curing compound. Membrane curing will not be permitted for concrete slabs that are to be covered with waterproof membranes or polymer-modified concrete.
3. Prior to placing sidewalks, the Contractor shall moisten the subgrade with water. There shall be no standing water on this surface when the sidewalk is poured.

I. Backfilling and Opening to Traffic:

Unbalanced backfilling against concrete structures will not be permitted until the concrete has attained a compressive strength of not less than twice the design unit stress shown on the plans, unless otherwise authorized.

Concrete culverts and bridges with concrete decks shall remain closed to traffic until permission to open them is granted. No vehicle will be allowed on any span until the concrete in the span has attained a compressive strength of not less than twice the design unit stress shown on the plans, and loads of any character having a total weight in excess of four thousand (4,000) pounds will not be permitted on any span until the concrete in the span has attained a compressive strength of not less than two and one-half times the design unit stress shown on the plans.

The compressive strength shall be determined from informational test cylinders cured on the site under similar conditions of temperature and moisture as the concrete in the structure.

J. Cleaning Up:

Upon completion of the structure and before final acceptance, the Contractor shall remove all falsework, and falsework piling shall be removed or cut off at least two feet below the finished ground line.

501—4.00 MEASUREMENT AND PAYMENT

501—4.01 GENERAL

Concrete will be paid for in place or as incidental to another bid item.

501—4.02 MEASUREMENT

When the bid schedule lists the appropriate lump sum pay item, Class A or Class A—A concrete will not be measured, except as provided in Section 501—4.03. When approximate quantities of Class A or Class A—A concrete are shown on the plans for informational purposes, the indicated quantities do not include any allowance for additional concrete that may be required for forming bridge decks with permanent metal forms.

When the bid schedule lists the appropriate unit price pay item, the quantity of concrete to be paid for shall be the actual volume or length of each class accepted in place in the finished structure, not to exceed the limits shown on the plans or ordered in writing. If a seal course is called for in the plans and, upon excavation to the bottom of footing elevation, it is found that seal course is not required to control the water in the excavation, the Engineer may order in writing the elimination from the work of any part of all of the Class S concrete called for in the plans and the structural excavation required therefore. Where no bid item is provided in the bid schedule for Class S concrete and a seal course is deemed necessary, in the opinion of the Engineer, the Class S concrete placed in the seal course will be paid for at the value per cubic yard determined in accordance with Section 501—4.03 for Class A concrete. Any Class S concrete placed more than eighteen inches outside the dimensions of the footing, or of a thickness greater than that shown on the plans shall be considered as being for the sole purpose of expediting the work of the Contractor and will not be included in the quantity to be paid for.

When the design does not permit deletion of the seal concrete, but conditions are such that the seal concrete can be placed in dry conditions, the Contractor may place concrete conforming to the requirements of Class A in the seal. Such concrete will be paid for at the price bid for Class S concrete.

Other Items. The quantities of reinforcing steel and other contract items which are included in the completed and accepted structure shall be measured for payment in the manner prescribed for the items involved.

Joint filler will not be measured for payment, but will be considered incidental to concrete.

Retaining walls will be measured on a lineal feet basis.

501—4.03 PAYMENT

1. Lump Sum Price Basis. When concrete is to be paid for at the respective contract lump sum price, the estimate of the volume of concrete shown on the plans is to be used as a basis for payment only as specified below.

If changes or additions in the work which change the volume of concrete to be furnished are ordered by the Engineer, the lump sum will be adjusted as follows:

The value per cubic yard of the increase or decrease in the volume of Class A or Class A—A concrete involved in the change shall be determined by dividing the lump sum bid for that class of concrete by the estimate of volume shown on the plans. The adjusted lump sum payment shall be the lump sum bid plus or minus the value of the Class A or Class A—A concrete involved in the change, and no additional compensation, except as specified above, will be made because of the change.

The method of forming concrete bridge decks, i.e., permanent metal or removable forms, shall not constitute a basis for revising quantities under this specification.

No adjustment in the contract price for Class A or Class A—A concrete shall be made if the Contractor elects to use a polymer—modified concrete deck protection system.

2. Unit Price Basis. Concrete shall be paid for at the contract price as provided in Section 501—4.02.

Payment will be made under:

<u>PAY ITEM NO.</u>	<u>PAY ITEM</u>	<u>PAY UNIT</u>
501(1)	Class A Concrete	Lump Sum
501(2)	Class A—A Concrete	Lump Sum
501(3)	Class W Concrete	Lump Sum
501(4)	Class A Concrete	Cubic Yard
501(5)	Class S Concrete	Cubic Yard
501(6)	Class W Concrete	Cubic Yard
501(7)	Retaining Wall	Lineal Feet

END OF SECTION

SECTION 502

RESERVED

SECTION 503 REINFORCING STEEL

503—1.00 GENERAL

503—1.01 DESCRIPTION

A. Work Included:

This work shall consist of furnishing and placing reinforcing steel in conformance with the plans.

B. Related Work Described Elsewhere:

Section 501 Structural Concrete

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

503—1.02 QUALITY ASSURANCE:

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used.

C. Codes and Standards:

American Welding Society D 12.1
Concrete Reinforcing Steel Institute

D. Source Quality Control:

503—1.03 SUBMITTALS

Where bar lists and bending schedules do not appear on the plans, order lists and bending diagrams shall be furnished by the Contractor for approval according to Section 104—1.02.

503—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

503—2.00 PRODUCTS

503—2.01 MATERIALS STANDARDS

General:

Reinforcing steel shall conform to the requirements of Section 709—2.01. Only Grade 60 reinforcing steel shall be used on bridges. Where Grade 40 reinforcing steel is specified for other structures, Grade 60 may be substituted provided the substitution results in no increased cost to the Owner.

Spiral reinforcing steel may be either smooth or deformed bars and shall be furnished in one continuous or butt welded bar, except that spirals with a height exceeding twenty feet may be field spliced using laps of one and one—half turns.

503—3 .00 EXECUTION

503—3.01 CONDITIONS

- A. Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

- B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

503—3.02 INSTALLATION

- A. Bar List:

The bar list and bending schedule are made for the purpose of arriving at an estimate of quantities. The Contractor shall verify the quantity, size and shape of the bar reinforcement against the structure drawings and make any corrections before ordering.

Where bar lists and bending schedules do not appear on the plans, order lists and bending diagrams shall be furnished by the Contractor for approval in accordance with Section 104—1.02. The approval of order lists and bending diagrams will not relieve the Contractor of the responsibility for their accuracy. Any expense incident to the revision of material furnished in accordance with such lists and diagrams to make it comply with the design drawings shall be borne by the Contractor.

- B. Protection of Materials:

Reinforcing steel shall be protected at all times from damage. When placed in the work, the reinforcing steel shall be free from dirt, loose scale and rust, paint, oil or other foreign substance.

All systems for handling coated bars shall have padded contact areas for the bars wherever possible. All bundling bands shall be padded and all bundles shall be lifted with a strong back, multiple supports or a platform bridge to prevent bar to bar abrasion from sags in the bar bundle. The bars or bundles shall not be dropped or dragged. Bars bent in handling shall be rejected.

C. Bending:

Unless otherwise permitted, all reinforcing bars shall be bent cold. Bars partially embedded in concrete shall not be field bent except as shown on plans. Should the Engineer approve the application of heat for field bending reinforcing bars, precautions shall be taken to assure that the physical properties of the steel will not be materially altered. All hooks and bends shall conform to the current manual of standard practice of the CRSI unless otherwise noted.

D. Placing and Fastening:

Reinforcing bars shall be accurately placed as shown on the plans and shall be securely held in position during the placing and setting of the concrete. Bars shall be tied with number fourteen (#14) or number sixteen (#16) gauge steel wire at all intersections except where bar spacing is twelve inches or less in both direction, in which case alternate intersections shall be tied. Unless shown on the plans or permitted by the special provisions, reinforcing steel shall not be welded without written authorization.

Distances from the forms shall be maintained by means of pre—cast mortar blocks or metal chairs, spacer, metal hangers or supporting wire of sufficient strength to resist movement under construction loads. Metal supports which extend to the surface of the concrete shall be stainless steel or protected by plastic coating to prevent corrosion. Wooden supports shall not be used. Supports under deck slab reinforcement shall be spaced not more than four feet apart in each direction.

Placing bars on layers of fresh concrete as the work progresses and adjusting bars during placing of concrete will not be permitted. Dowels shall be securely fastened in position before concrete in which they are to be embedded is placed in the form, except that curb or sidewalk dowels may be placed after the deck concrete has received the preliminary finish.

All reinforcing steel, other than stirrups or spacers, shall have a coverage of two inches, measured from the surface of the concrete to the outside of the bar, unless otherwise shown. Stirrups and spacers shall be embedded not less than one inch clear, except when exposed to earth the minimum embedment shall be one and one—half inches.

Coated hardware shall be used for supporting and fastening epoxy—coated reinforcing steel. The coating shall be plastic, epoxy or similar material.

Wire mesh reinforcement shall be continuous between joints in slabs on grade. Laps shall be at least one full mesh plus two inches; staggered to avoid continuous lap in either direction; and securely wired or clipped with standard clips. Mesh shall be support on precast concrete units in a manner that will support the mesh at the minimum height indicated. Dowels and tie bars in slabs on grade shall be installed at right angles to joints; accurately aligned parallel to the finished surface; and rigidly held in place and supported during concrete placement. One end of dowels shall be oiled or greased.

E. Splicing:

Unless otherwise shown on the plans, bars to be spliced shall be lapped at least twenty bar diameters, except that bars near the top of beams and girders having more than twelve inches of fresh concrete below the bars shall be lapped at least thirty—five bar diameters.

Number 14S and 18S bars shall not be spliced except as shown on the plans or as directed.

When splices are made by butt welding, a joint efficiency of one hundred percent (100%) shall be obtained. The bars shall be preheated to two hundred fifty degrees fahrenheit (250°F.) and then welded using low hydrogen electrodes and procedures recommended in AWS D 12.1.

503—4.00	MEASUREMENT AND PAYMENT
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503—4.01 GENERAL

Not Used.

DIVISION 600

UTILITY, DRAINAGE, MINOR STRUCTURES,

AND

INCIDENTAL CONSTRUCTION

SECTION 601 - 602

RESERVED

SECTION 603 CULVERTS AND STORM DRAIN SYSTEMS

603—1.00 GENERAL

603—1.01 DESCRIPTION

A. Work Included:

Consists of furnishing all materials and work required to install pipe, fittings, and all incidentals necessary to construct a complete operating storm drain system. In addition to new storm drain construction, the work shall also include removal and salvage or relocation of existing storm drain, repair of damaged storm drain, and any other items required to complete the work described on the plans and in these specifications.

B. Related Work Described Elsewhere:

1. Construction Surveying by the Contractor, Section 114.
2. Removal of Structures and Obstructions, Section 202.
3. Structural Excavation and Backfill, Section 205.
4. Manholes and Inlets, Section 604.
5. Metal Pipe, Section 707.
6. Structural Concrete, Section 501.

C. Work Installed But Furnished Under Other Directives:

Not Used.

D. Work Furnished But Not Installed:

Not Used.

603—1.02 QUALITY ASSURANCE

A. Codes and Standards:

Where provisions of pertinent codes and standards conflict with these specifications, the more stringent provisions shall govern.

B. Compliance of materials:

All material furnished under this Contract shall conform to the requirements stated herein and shall be subject to the factory inspection and tests prescribed in this specification. Each length of pipe and fittings shall be subject to visual inspection at the factory, trench, or other point of delivery by a competent inspector employed by the Owner. The purposes of the inspection shall be to establish conformance with the requirements of these specifications.

Evidence of compliance with these specifications shall be furnished by the Contractor, before construction begins. Copies of laboratory test reports or manufacturer's certificates of

compliance shall be furnished with all items of incorporated materials. This shall consist of a copy of the manufacturer's test report or a statement by the seller, accompanied by a copy of the test results, that the pipe and fittings have been sampled, tested, and inspected in accordance with the provisions of this specification. Each certification so furnished shall be signed by an authorized agent of the seller or manufacturer. Under no circumstances shall any materials be installed until such certification is furnished.

All pipe and fittings shall be marked at least once by the manufacturer with trade name, nominal size, the ASTM Specification number, and the type and grade.

The maximum allowable deflection of corrugated steel pipe (CSP) after installation is 5 percent.

Any CSP more than 5 percent out of round after installation may be rejected by the Project Engineer and shall be removed and replaced at the Contractor's expense.

C. Compliance of Installation:

The Engineer may, at any time, order inspection of any phase of the installation to verify compliance. The Contractor shall assist the Engineer or his representative in performing the inspection and quickly correct deficiencies noted. At the conclusion of all, or a portion, of the installation the Engineer may order T.V. inspection, "lamping", or any other inspection method to verify compliance with the plans and specifications.

603—1.03 SUBMITTALS

A. Manufacturer's Recommendations:

Prior to the start of the project, submit 2 copies of the manufacturer's current recommended method of installation for all materials to be used on the job.

Within thirty (30) days after award of Contract, and before any of the materials of this section are delivered to the job site, submit two (2) copies of a complete list of all materials and equipment proposed to be furnished and installed under this portion of the work, giving manufacturer's name, catalog number, and catalog cut for each item where applicable.

B. Certification:

Evidence of compliance with materials specifications shall be furnished by the Contractor, before construction begins. Copies of laboratory test reports or manufacturer's certificates of compliance shall be furnished with all items of incorporated materials. This shall consist of a copy of the manufacturer's test report or a statement by the seller, accompanied by a copy of the test results, that the pipe and pipe fittings supplied comply with provisions of this specification. Each certification so furnished shall be signed by an authorized agent of the seller or manufacturer. Under no circumstances shall any materials be installed until such certification is furnished.

603—1.04 PRODUCT MATERIAL HANDLING

A. Protection:

Use all means necessary to protect materials of this section before, during, and after installation and to protect the installed work and materials of all other trades.

B. Replacements:

In the event of damage, immediately make all replacements necessary to the satisfaction of the Engineer and at no additional cost to the Owner.

C. Manufacturer's Instructions:

All material shall be handled in accordance with the manufacturer's recommended method of handling.

D. Cause For Rejection:

Materials which, in the judgment of the Engineer, are not being handled in accordance with the manufacturer's recommended method of handling, or with other provisions of this specification, shall be rejected. Materials shall be removed from the job site and shall not be used for any other work done for the Owner.

603—2.00 PRODUCTS

603—2.01 MATERIALS STANDARDS

A. General:

All materials furnished under this Contract shall conform to the requirements stated herein. Any substitutes shall be submitted for approval prior to the bid.

All materials shall be capable of withstanding direct application of 220°F steam for a period of three (3) hours without change in their mechanical and thermal properties.

B. Pipe Materials and Specialties:

1. General:

The Contractor shall furnish and install all pipe as indicated on the drawings, according to these specifications, and according to the manufacturer's instructions.

2. Corrugated Steel Pipe:

CSP shall conform to the requirements of AASHTO M36 and AASHTO M218. Minimum thickness for specified sizes shall be as noted in the plans. CSP shall be helically corrugated pipe.

3. Ductile Iron Pipe:

Ductile Iron Pipe shall conform to AWWA Standard C—151 and shall be of minimum thickness Class 50.

4. Wood Stave Pipe:

Wood stave pipe shall be treated with pentachlorophenol, or creosote, or chromated copper arsenate, or an equal preservative approved prior to manufacture, and shall withstand 50 foot head in accordance with the specifications contained herein.

a. Staves:

All lumber shall be Douglas Fir, Cedar or Redwood. Staves for treated pipe shall be sound and free from decay, dry rot, injurious checks, wind shaled, wane, loose or rotten knots, large pitch pockets, and other imperfections which impair the strength, durability of usefulness in the construction of a serviceable sewer line. Sap wood shall not be considered a defect in the lumber for creosoted staves.

Cross grain shall not have an angle of greater than one inch (1") in eight inches (8"). Pitch seams shall not extend more than one quarter (1/4) of the way through the piece, nor shall they be longer than four inches (4"). No through knots or knots at the edges of staves will be allowed, but sound knots not over one half inch (1/2") in diameter and not penetrating through the stave may be allowed. All lumber used shall be thoroughly seasoned either by air drying or kiln drying before being milled in to staves. Staves shall be dressed to the true circles of the inside diameter and the outside diameter, and shall be dressed at the edges to conform to the radial lines of the pipe and so that there is a bead on one edge and a corresponding groove on the other edge. All the staves for a given size of pipe shall be of uniform thickness and width. The staves shall extend the full length of the pipe section in which they are used.

All staves to be treated shall be thoroughly seasoned and milled to the pipe stave pattern before treatment. The treatment shall be by the vacuum and pressure process and a sufficient quantity shall be forced into the wood to insure a net retention of preservative as specified by the American Wood Preservers' Association's most recent standards after the final vacuum.

The entire process shall be done in accordance with the applicable specifications of the American Wood Preservers Association, and in such a manner as to guarantee the treatment specified without warping or otherwise damaging the staves and leaving them free from excess oil.

5. Banding:

The wire banding shall be heavily galvanized mild steel pipe banding wire having a tensile strength of 55,000 to 65,000 pounds per square inch of cross section. The design of size and spacing of banding wire shall be such as to create a working stress of not more than 15,000 pounds per square inch of cross section of the wire when the internal pressure is equal to that of the design head. The spacing of the wire, in no case, shall be such as to create a pressure on the wood of greater than 800 pounds per square inch assuming a contact width equal to the radius of the wire.

Bands and shoes for individual banded collars shall be asphalt coated.

The banding of the pipe shall be done in accordance with the latest methods and with machinery specially designed for this purpose. Each end of the pipe shall have a triple wrap and the staples shall be spaced at not more than 18 inches throughout the length of the section and shall be located spirally around the pipe. The spacing of wire on the wire—wound collars shall be such as to provide strength of at least 50 percent greater than the wire wrappings of the pipe with which they are used.

C. Joints and Fittings:

1. Joints and Fittings for Corrugated Steel Pipe (CSP)

Joints and fittings for CSP shall conform to AASHTO M36 and AASHTO M218 and shall be of minimum thickness as noted in the plans.

If helically corrugated pipe with at least two annular corrugations rolled into each end is furnished, a band specifically designed to couple this pipe may be used. The band shall be a minimum width as shown on the plans, shall have a continuous annular corrugation on each side that matches the second corrugation of the pipe installed and shall be drawn together by at least two 1/2—inch bolts through the use of a bar and strap suitably welded to the band. These bands shall be furnished with two threaded steel tightening rods with a suitable connecting fitting.

The tightening rods shall circumscribe the pipe in the band grooves and be securely tightened to furnish greater joint integrity. Approved gaskets that circumscribe the pipe under the band in the first annular pipe grooves such that infiltration is prevented are required.

Other bands that provide equal structural integrity and water tight connection may be substituted only with prior approval of the Engineer.

All bolted connections shall be furnished with cut washers placed between the nut and angle bracket, on nuts with integral washers.

Bends, saddles, end sections, and other fittings shall be as specified in the plans.

2. Joints and Fittings for Ductile Iron Pipe (DIP)

Pipe and fittings shall be furnished with rubber gasketed push—on tyton joint, mechanical joint, or equal. Joints shall conform to AWWA Standard C.111.

3. Joints and Fittings for Wood Stave Pipe (WSP):

Bends, adaptors, and other fittings shall be gray iron castings. The fittings to be used with wood pipe shall be especially designed for use for wood stave pipe and all outlets for connection to wood pipe shall be provided with smooth, truly circular hub ends. The hub wall thickness shall be a minimum of 5/8 inches. The method of manufacture and the quality of the casting shall be equal to, or superior to, that provided by ASTM Specifications A48 Class 30 for gray iron castings having 15,000 pounds minimum tensile strength. The castings shall be of uniform quality and free from blow holes, porosity, hard spots, shrinkage defects, cracks, and other injurious defects. They shall be smooth and well cleaned before inspection by sand blasting, tumbling, pickling, or other approved processes. Casting shall be of approved design as manufactured by Olympic Foundry, Inland Foundry, or equal. Saddles shall be secured on neoprene gasket to the sewer main with stainless steel bands as approved.

D. Insulation:

Materials shall be rigid closed cell, two (2) component urethane foam:

“K” Factor:	0.13 BTU—IN./HR.—FT— ² °F (ASTM C—177)
Water Absorption:	0.1 psf (ASTM C—2842 96 hours under 2” head)
Compressive Strength:	23 psi minimum (ASTM D—1621 perpendicular to rise)
Nominal Density:	2 to 4.0 pcf (ASTM D—1622)
Water Vapor Permeability:	2.0 perm—in. (ASTM C—355)

Any system or applicator shall be able to demonstrate prior experience for at least two (2) years and the Engineer shall be the sole judge of the qualifications of a system, material, application method, and applicator.

E. Insulation — Polystyrene Foam:

Only extruded polystyrene foam rated for direct burial is acceptable.

“K” Factor:	0.20 BTU—IN. /HR.—FT ² °F t—177) (ASTM C-177)
Water Absorption:	0.8% by volume (ASTM C—2842)
Compressive Strength (Min):	20 psi (ASTM D—1621)
Nominal Density:	1.5 — 2.5 pcf (ASTM D—303)
Water Vapor Permeability (Max):	0.7 perm—in. (ASTM C—355)
Dimensional Stability:	2% (ASTM D—2126)
Coefficient of Linear Expansion:	3.5 x 10 ⁻⁵ FT/°F

Extruded polystyrene foam shall be DOW HI, DOW SM manufactured by Dow Chemical Company, or Foamular manufactured by U.S. Gypsum Company, or an approved equal.

F. Protective Coatings:

Waterproof coatings shall yield a permeance to water vapor no greater than 0.1 U.S. Perms.

Tensile Strength (Min):	1800 psi (ASTM D—412)
% Elongation (Max):	300% (ASTM D—412)

Heat shrinkable plastic tubing will be an acceptable coating provided it incorporates an adhesive which makes a water proof joint between the heat shrink sleeve and the base material.

G. End Sections:

End Sections shall conform to the requirements of AASHTO M36 and AASHTO M218. Minimum thickness for specified sizes shall be as noted in the plans.

603—3.00 EXECUTION

603—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect the installed work of all other trades and verify that all work is complete to the point where this installation may properly commence.

Verify that all work may be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of discrepancy, immediately notify the Engineer.

Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

603-3 .02 INSTALLATION

A. General:

Install all work in strict accordance with the manufacturer's recommendations as approved by the Engineer.

B. Installation of pipe:

1. Excavation and backfill shall conform to Section 205—3.01.
2. Pipe bedding shall conform to Section 205—3.02 or as specified in the plans.
3. The pipe laying shall begin at the downstream end of the pipe. The lower segment of the pipe shall be in contact with the shaped bedding throughout its full length. Bell or groove ends of rigid pipe and outside circumferential laps of flexible pipe shall be placed facing upstream.

Paved or partially lined pipe shall be laid so that the longitudinal center line of the paved segment coincides with the flow line. Elliptical and elliptically reinforced pipes shall be placed with the major axis within five degrees of vertical plane through the longitudinal axis of the pipe.

If the spelter coat on galvanized metal pipe is damaged during installation, the Contractor shall make necessary repairs to the spelter in accordance with AASHTO M36.

The repair of the spelter coat shall be performed by the Contractor at no additional cost to the Owner.

Any pipe out of alignment, unduly settled, or damaged, shall be taken up and relaid or replaced. Final accuracy of all installed main piping shall be within 0.01 feet vertically and 0.05 feet horizontally of the exact location taken from the project plans. In no case will a reverse or flat grade be allowed. Pipe which exceed the above limits of variation shall be adjusted immediately and no further pipe shall be laid until so authorized by the Engineer.

When work is not in progress, open ends of pipe and fittings shall be securely closed to keep foreign matter, animals, and children from entering.

4. After the pipe is installed the trench shall be backfilled in accordance with Section 205 and the details shown on the plans.
5. After backfilling and compacting to an elevation of approximately 3 feet above the top of all storm drain pipe, the Contractor shall place one strip of utilities marking tape as shown on the project plans. The tape shall be vinyl tape 6 inches in width with the words "Storm Drain" written on it. When tape is placed above non—metallic pipe, said tape shall have a metallic strip on the back side.

C. Concrete Structures:

Concrete end section and trench drain construction standards shall be taken from Section 501 Structural Concrete and the typical details.

D. Relation With Water Lines:

Where storm drain and water or sanitary sewer lines cross, the storm drain and/or structure shall be insulated as directed on the plans. If the water or sewer main is found to be uninsulated, the Contractor shall, on the Engineer's direction, insulate any portion of that line exposed during the work.

E. Pipe Repair:

1. General

Where storm sewer mains are damaged or broken, they shall be repaired or replaced by the Contractor, at no cost to the Owner, in accordance with the standard detail and these specifications.

2. Ductile Iron Pipe

Ductile Iron Pipe shall be cut flush and replaced with a similar section of pipe utilizing flexible couplings, Rockwell 433, or equal.

3. Wood Stave Pipe

The length of damage section to be removed shall be determined in the field by the Engineer. Replace with same inside diameter and head class of WSP utilizing approved full circle repair clamps as shown in the details.

4. Corrugated Steel Pipe

When a section of CSP is damaged all affected joints shall be replaced. Only when conditions warrant and with written approval of the Engineer will a "cut—out" repair be allowed, in accordance with the standard detail.

F. Insulation — Urethane Foam:

1. General

Urethane foam material shall be spray applied to clean pipe and fittings, free of loose dirt, debris, or other foreign material. Insulate all exposed sewer and water pipe, services, and fittings previously not insulated. Any insulation on existing pipe that is damaged shall also be repaired.

No foam shall be applied during periods of precipitation or to damp or wet surfaces.

Urethane Foam is not acceptable for use on installations below the water table unless all exposed surfaces are covered with a water proof coating.

2. Pipe Insulation

Urethane foam insulation thickness shall be no less than two inches (2"), and shall be applied 360° on the pipe. Foam may be applied in the ditch or in a local yard, if approved by the Engineer, except that couplings and any fittings shall be insulated after installation. The Contractor shall furnish labor, materials and services necessary incidental to field applied spray urethane foam insulation. Insulate all pipe exposed as a result of Contractor's operations with at least two inches (2") insulation.

3. Fittings

Insulate all fittings requiring insulation with at least two inches (2") of sprayed on urethane insulation.

G. Insulation — Polystyrene Foam:

1. General

Polystyrene foam is not acceptable for use on installations below the water table unless all exposed surfaces are covered with a water proof coating. Polystyrene foam insulation shall not be utilized except where it is specifically called for on the plans or with the written permission of the Engineer.

2. Pipe Insulation:

Insulate all pipe and fittings 360° with two inches (2") of Polystyrene Insulation. Insulation shall be placed on a flat, evenly graded surface with no sharp protuberances that would puncture or otherwise damage the insulation. Backfill shall be placed such that the insulation will not be damaged.

H. Protective Coating:

Protective coating shall not be applied to installation or previously applied coating that is damp or dirty. When applied to a previously coated insulation, the new application shall overlap a minimum of six inches (6"). The Contractor shall follow closely the manufacturer's installation instructions.

Any punctures to the protective coating shall be repaired immediately.

I. End Sections:

End sections shall be constructed as shown in the standard details.

603—3.03 TESTING AND ACCEPTANCE

A. Tests:

Not Used

B. Acceptance

Upon receipt of written notice from the Contractor that the work is complete and ready for final inspection and acceptance, the Engineer will promptly make such inspection; and notify the Contractor of any deficiencies or action necessary to make the system acceptable to the City. Upon correction of the deficiencies, or completion of the requested action, the City Engineer will promptly recommend appropriate action; e.g. the City acceptance of the system for ownership, maintenance and operation, or, if part of a larger project, acceptance of that portion of the work so as to allow appropriate public utilization of that portion of the work.

C. Cleaning:

When all installation work is complete the Contractor shall at his expense remove all debris from all pipe, manholes, catch basins, or other portions of the storm sewer system that were affected by the Contractor's operations.

603—4.00 MEASUREMENT AND PAYMENT

603—4.01 GENERAL

Payment for the work will not be made until the work is complete and in place.

Excavation, bedding, and backfill for pipe, including excavation below flow line grade will be measured and paid for as provided in Section 205.

603—4.02 MEASUREMENT AND PAYMENT

A. Pipe:

Measurement will be along the horizontal projection of the pipe from center to center of manholes or inlets.

Payment for storm sewer pipe, new or replaced, will be on the basis of the Contract unit price per foot of storm sewer pipe including furnishing and installing pipe and all fittings complete in place as described, cleaning, labor, and supervision as prescribed in the plans and specifications.

B. Repair Damaged Storm Pipe:

Repair of storm drain mains and inlet laterals not shown on the plans or located by the Owner and damaged as a result of the Contractors operation shall be measured per each basis.

Payment for damaged storm pipe shall be on the basis of fully repairing the damaged section, including maintenance of flow, grading, furnishing of pipe and fittings and all other work as described in the plans and specifications.

C. Insulation of Pipe:

Measurement will be along the horizontal projection of the pipe for the length of the pipe to be insulated as called for on the plans.

Payment for insulated pipe will be on a linear foot basis to include furnishing and installing insulation complete in place, all labor, and supervision as prescribed in the plans and specifications.

D. End Section:

Measurement will be on a per each basis in place.

End sections will be paid for on a per each basis including all labor, materials, and supervision as described in the plans and specifications.

603—4.03 BASIS OF PAYMENT:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
603(1)	___ inch corrugated steel pipe	Linear Foot
603(2)	___ inch ductile iron pipe	Linear Foot
603(3)	___ inch wood stave pipe	Linear Foot
603(4)	End section for _____ inch CSP	Each
603(5)	Concrete end section	Each
603(6)	Trench drain	Linear Foot
603(7)	Repair damaged storm drain pipe	Each
603(8)	Storm drain saddle type	Linear Foot
603(9)	Insulation of _____ pipe	Linear Foot

END OF SECTION

SECTION 604 MANHOLES, INLETS, AND CATCH BASINS

604—1.00 GENERAL

604—1.01 DESCRIPTION

A. Work Included:

This work shall consist of the construction, relocation, or adjustment of manholes, catch basins, conformity with these specifications and the lines and the plans or established by the Engineer.

B. Related Work Described Elsewhere:

Section 205 Structural Excavation
Section 501 Structural Concrete

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

604—1.03 SUBMITTALS

A. Not Used.

604—1.04 PRODUCT/MATERIAL HANDLING

A. Precast manhours, inlets, and catch basins shall not be dropped at anytime during handling.

B. Vibratory compaction equipment shall not be allowed within 100 feet of a manhole, catch basin or inlet that has been cast in place until the concrete or mortar has cured 72 hours.

604—2.00 PRODUCTS

604—2.01 MATERIALS STANDARDS

General:

Concrete for these structures shall conform to the requirements of Section 501. Except as provided in this section, other materials shall conform to the following:

Corrugated Metal Units	712—2.07
Clay or Shale Brick	704—2.01
Concrete Bric k	704—2.02
Concrete Masonry Block	704—2.03
Joint Mortar	705—2.03
Frames, Grates & Covers & Ladder Rungs	712—2.06
Reinforcing Steel	709—2.01
Pre—cast Concrete Units	712—2.05

The manholes shall be completely water—tight and materials used in construction shall conform to the requirements of ASTM Specification Designation C—478, AASHTO M199 and approved details. Where these standards conflict, the more stringent provision shall control.

Each pre—cast concrete barrel section shall be set and sealed by use of a plastic gasket pipe joint sealer as manufactured by K. T. Snyder Company, Inc., Ram—Nek Gasket Division, 2100 Travis Street, Houston, Texas, or equal.

Heavy duty standard street traffic covers shall be fabricated from cast iron as per ASTM A 48 CLASS 24 (H—20 Loading) and approved design. The traffic cover shall have an overall outside diameter of 31 inches with a clear diameter opening of 23 inches. Overall depth shall be 10 inches with a 7 inch height from flange. The traffic cover shall have the word “SEWER” or “STORM” lettered on the lid, whichever is applicable. Manhole lids will be solid except for one hole perforation for lifting unless as otherwise noted on plans. Manhole ring and covers shall be machine finished or ground on seating surfaces so as to assure non—rocking fit in any position, and interchangeability. Manhole rings and covers shall be IFCO #547, Olympic Foundry Model 5945 “Fairbanks Standard,” or approved equal.

Manhole inverts shall be formed of Class A concrete.

Sewer manhole inflow insert shall be PRECO Industries, Plainview, New York, Model NEC—4 or equal; constructed of corrosion proof and water impenetrable material. Two relief valves for gas and vacuum conditions are required.

Extruded polystyrene shall be DOW styrofoam SM or equal, with a minimum density of 2.0 pcf, meeting ASTM D—1621 maximum deformation of 5 percent at 15 psi.

604—3.00 EXECUTION

604—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

604—3.02 INSTALLATION

A. Construction Requirements:

The Contractor shall furnish and install or make connections to or reconstruct sewer manholes as indicated on the construction drawings according to these guidelines and the manufacturer's instruction.

The manhole rings and covers shall be brought to the grades shown on the plans unless otherwise approved by the Engineer. Manhole rings shall be set in full bed of grout and made secure.

The pre—cast concrete manhole tops shall be flat lid or eccentric cones. Two concrete adjustment rings, or at least two covers of concrete bricks, shall be set in non—shrink grout between the concrete top and the cast iron manhole ring for the lid and the rings shall add to the total manhole height of between six and twelve inches (6" & 12"). Adjustment to final grade shall be made with a cast iron insert ring, non—shrink grout, a concrete adjusting ring or some combination of the above.

The concrete base and first section shall be cast together. The base shall be six inches (6") thick and either sixty—four inches (64") square or sixty—four inches (64") diameter for forty—eight inch (48") manholes. The base shall be ten inches (10") thick and either ninety—two inches (92") square or ninety—two inches (92") diameter for seventy—two inch (72") manholes. The reinforcement shall be placed in accordance with the Standard Detail.

Openings shall be provided to meet job requirements as indicated on the plans. They shall be circular, tapered in toward the inside of the section, and shall be held to the minimum size possible to accommodate the pipe to be inserted and to effectively seal the joint.

In sanitary sewer manholes two—inch (2") rigid board insulation of extruded polystyrene will be installed on the interior floor of the manhole. A layer of 1/2 inch CDX or AWW plywood or 1"x6" tongue—in— groove planks tightly fitted to the manhole walls, will be placed on top of the rigid insulation. Concrete for the invert channels will be placed on the wood base.

In sanitary sewer manholes invert channels shall be smooth and semicircular in shape conforming to the inside of the connecting sewer section. Changes in directions of flow shall be made by forming a smooth radius sized to allow adequate access of a T.V. camera and/or maintenance equipment into the served sewer pipe. Changes in size and grades of the channels shall be made gradually and evenly. The invert channels may be formed and poured in place, or may be constructed by laying a full section of sewer pipe through the manhole and cutting out the top half after surrounding concrete has hardened. All manholes without branch lines, grade changes, or direction changes shall have a continuous sewer pipe through it. The floor of the manhole outside the channels shall be smooth and shall slope towards the channels at a grade of one inch (1") per foot.

In sanitary sewer manholes with branch lines, grade changes, or direction changes, individual pipe sections shall project 8 inches into the manhole at the elevation shown on the plans. The watertight connection of the pipe into the manhole shall have grout sloped all around pipe exposed surfaces from the walls of base, The placed concrete invert shall be the height of the pipe and the concrete shall be tied to the base.

Manholes shall be installed at the locations shown on the plans such that primary leads enter radially at the invert elevations specified. The base section shall be set plumb on a prepared surface of twelve inches (12") of select gravel bedding material compacted to 95 percent optimum density on the undisturbed subgrade.

Exterior sprayed urethane foam insulation, a minimum of two inches (2") thick shall be placed on all external surfaces (except the bottom, manhole frame, and cover) of all sanitary sewer manholes prior to backfill.

Storm drain manholes will be constructed to the same specifications as the sewer manholes except no formed invert will be installed. A one foot (1') deep sump will replace a formed invert and the cover shall read "STORM" instead of "SEWER". Insulation will not be required on storm drain manholes, unless so indicated on the plans. When required, the specifications for sewer manhole insulation will apply, except that the two inch (2") board insulation and wood layer shall be placed on the outside of the manhole base.

Catch basins will be constructed in the manner shown in the storm drain detail sheets. Insulation will not be required unless so indicated on the project plans. When required, the specifications for storm drain manhole insulation will apply.

Three layers of 6 mil polyethylene sheeting shall be wrapped around all manholes, inlets, and catch basins with a minimum of eighteen inches (18") of overlap over the whole length of the structure to prevent frost jacking.

Pipes entering storm drain manholes will extend a maximum of two inches (2") beyond the inside wall of the manhole. Pipes entering storm drain catch basins shall be flush with the inside wall of the box.

Install inflow insert as shown on the standard details. The insert shall fit under the manhole cover. Two relief valves for gas and vacuum conditions, and 1/4" rope handle are required. Two inches (2") of urethane foam will be applied to the upper side. Valves will be protected during application of foam.

Existing sewer flow shall not be impeded during construction.

Relocation of catch basins shall consist of reinstalling basins at new locations.

B. Reconstructing Manholes:

Adjustment of existing manholes and inlets shall consist of raising or lowering the frame or ring casting one foot (1') or less and not requiring reconstruction of the cone section.

Reconstructing manholes shall consist of one or more of the following:

1. The work necessary to bring the manhole frame and cover to grade when the cone must be removed for lowering.
2. The work necessary to raise the manhole frame and cover more than one foot.
3. The work necessary to reconstruct a portion of the manhole as specified with no change in line or grade.
4. The work necessary to tap one or more additional pipes into an existing manhole.

The manholes shall be reconstructed to the required elevation and to conform essentially to the details on the plans. The work shall conform to the requirements above specified for new construction except that material may be re—used if of satisfactory quality and approved by the Engineer. The frames and covers of existing structures may re—used.

Reconstruction of wood stave manholes shall consist of the work required to remove the cast iron frame and lid and concrete manhole top, the removal of a specified amount of wood stave manhole barrel, replacing the concrete manhole top and adjusting the cast iron frame and lid to the specified grade.

Existing sewer flow shall not be impeded during construction. Relocation of catch basins shall consist of reinstalling basins at new locations.

604—4.00	MEASUREMENT AND PAYMENT
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604—4.01 GENERAL

Not Used.

604—4.02 MEASUREMENT

Manholes, inlets, and catch basins, new; insulated; relocated; and reconstructed as applicable, will be measured by the unit completed and accepted in final position.

604—4.03 PAYMENT

The accepted quantity shall be paid for at the contract price per unit of measurement, for each of the particular pay items shown in the bid schedule, complete in place.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
604(1)	Storm Sewer Manhole	Each
604(2)	Sanitary Sewer Manhole	Each
604(3)	Reconstruct Existing Manhole	Each
604(4)	Adjust Existing Manholes	Each
604(4A)	Adjust and Insulate Existing Manholes	Each
604(5)	Inlets	Each
604(6)	Catch Basins	Each
604(7)	Relocate Catch Basins	Each

Excavation and backfill for manholes, inlets, and catch basins will be measured and paid for as provided in Section 205.

Where Items 205(1), 205(2), 205(3), or 205(4) do not appear in the bid schedule, the work required for these items will not be paid for directly, but shall be considered incidental.

END OF SECTION

SECTION 605

RESERVED

SECTION 607 FENCES

607—1.00 GENERAL

607—1.01 DESCRIPTION

A. Work Included:

This item shall consist of furnishing all new materials and erecting barbed wire fence, woven wire fence or chain link fence and gates as required or reconstructing fences previously removed, in reasonably close conformance with the plans or as directed.

Barbed wire fence shall consist of galvanized barbed wire fastened to metal posts as shown on the plans.

Woven wire fence shall consist of galvanized barbed wire and galvanized farm fence fastened to metal posts as shown on the plans.

Chain link fence shall consist of chain link fabric attached to metal posts and fastened to a tip and a bottom tensioning wire. The height of chain link fences shall be as shown on the plans or designated in the bid schedule.

B. Related Work Described Elsewhere:

Not Used.

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

607—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used.

C. Codes and Standards:

Not Used.

D. Source Quality Control:

Not Used.

607—1.03 SUBMITTALS

Not Used.

607—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

607—2.00 PRODUCTS

607-2.01 MATERIALS STANDARDS:

A. General:

Materials shall conform to the following:

Woven Wire	710—2.02
Barbed Wire	710—2.01
Chain Link Fabric	710—2.03
Fence Posts	710—2.05
Concrete (or an approved, pre-mixed, sacked concrete)	501—3.01

Any one of the types of chain link fabric specified in Section 710 may be furnished under Item 607(3), Chain Link Fence. Intermixing of fabric types will not be allowed.

607—3.00 EXECUTION

607—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

607—3.02 INSTALLATION

A. General:

The Contractor shall perform such clearing and grubbing as may be necessary to construct the fence to the required grade and alignment.

Prior to installing fence, the existing ground along the line of the fence location shall be graded to a smooth uniform surface, to the extent that no abrupt changes in grade exist between adjacent fence posts.

A. General: (Continued)

At locations where breaks in a run of fencing are required, or at intersections with existing fences, appropriate adjustment in post spacing shall be made to conform to the requirements for the type of closure indicated.

When the plans require that posts, braces or anchors be imbedded in concrete, the Contractor shall install temporary guys, or braces as may be required to hold the posts in proper position until such time as the concrete has set sufficiently to hold the posts. Unless otherwise permitted, no materials shall be installed on posts or strain placed on guys and bracing set in concrete until seven days have elapsed from the time of placing the concrete.

The tops of all posts shall be set to the required grade and alignment. Cutting of the tops of the posts will not be allowed.

In areas where muck excavation is designated on the plans or in unstable areas, as determined by the Engineer, fence posts shall be driven as shown on the plans or as directed.

Wire or fencing of the size and type required shall be firmly attached to the posts and braces in the manner indicated. All wire shall be stretched taut and be installed to the required elevations.

At each location where an electric transmission, distribution or secondary line crosses any of the types of fences covered by these specifications, the Contractor shall furnish and install a ground rod and connection to the fence conforming to the requirements of Section 9 of the National Electric Safety Code.

Ground rods and connectors shall be placed at minimum intervals of four hundred feet (400') along the fence. When fence runs are less than four hundred feet (400') in length, one ground rod with connection to the fence shall be required.

The Contractor shall perform such clearing and grubbing as may be necessary to construct the fence to the required grade and alignment.

Fence construction operations shall be so conducted as to prevent the escape of livestock. Existing cross fences shall be connected to the new fence and corner posts. Braces for every direction of strain shall be placed at the junction with existing fences and the wire in both fences properly fastened to the posts. At bridges, cattle passes and at culverts if shown on the plans, the new fence shall be connected to the structure in such manner as to permit the free passage of livestock through or under the structure.

Barbed wire, farm fence, and chain link fence fabric shall be fastened on the highway side of the posts.

Changes in line where the angle of deflection is thirty degrees (30°) or more shall be considered as corners and corner posts shall be installed. Changes in line where the angle deflection is more than fifteen degrees (15°) and less than thirty degrees (30°) shall be considered as alignment angles and adjacent posts shall be made fast to the angle posts by means of wire, or if such method is impracticable such posts shall be braced as detailed on the plans for gate, end and center posts.

At all grade deflections and alignment angles, where stresses tend to pull the posts from the ground, the fencing shall be snubbed, or guyed, at the critical point by means of a double

strand of nine gauge galvanized wire connected to each horizontal line of barbed wire or to the top and bottom of wire mesh fabric and to a deadman, weighing approximately one hundred (100) pounds, buried in the ground not less than two feet (2ft)• The fencing shall be pulled snug, close to the ground before snubbed or guyed.

Barbed wire and farm fence fabric (woven wire) shall be stretched taut and securely fastened to each post by means of suitable approved devices.

The Contractor shall provide temporary fencing or other structures as directed by the Engineer or on the plans to insure that the security of adjacent property owners is maintained during any required fencing work. This shall be incidental to the applicable fencing pay item.

Fence relocation or reconstruction shall include the removal of the existing fence and its reconstruction at the property line or as directed by the Engineer. Any new materials necessary to rebuild the fence shall be furnished by the Contractor and shall be identical as to type of material and finish.

607—4.00	MEASUREMENT AND PAYMENT
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607—4.01 GENERAL Not Used.

607—4.02 MEASUREMENT

Pay Item Numbers 607(7) and 607(8) will be measured by the linear foot, parallel to ground, measured at the base of the fence and will include gates.

607—4.03 PAYMENT

The accepted quantity of fence shall be paid for at the contract price per unit of measurement, for each of the particular pay items shown in the bid schedule, complete in place.

Concrete post foundations, ground rods and connections will be considered incidental.

Clearing and grubbing and grading required for fence installation will be considered incidental.

Where fence posts in excess of planned lengths are required, the excess will be paid for as extra work.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
607(1)	Barbed Wire Fence	Linear Foot
607(2)	Woven Wire Fence	Linear Foot
607(3)	Chain Link Fence	Linear Foot
607(4)	Reconstructed Fence	Linear Foot
607(5)	Fence Relocation	Linear Foot
607(6)	New Fence Installation	Linear Foot
604(7)	Relocate Catch Basins	Each

END OF SECTION

SECTION 608 SIDEWALKS

608-1.00 GENERAL

DESCRIPTION

- A. This work shall consist of the construction of asphalt or concrete sidewalks and driveway connections, in reasonably close conformance with the plans.
- B. Related Work Described Elsewhere:
Not Used.
- C. Work Installed but Furnished Under Other Directives:
Not Used.
- D. Work Furnished but Not Installed:
Not Used.

608—1.02 QUALITY ASSURANCE

- A. Qualifications of Manufacturers:
Not Used.
- B. Qualifications of Installers:
Not Used.
- C. Codes and Standards:
Not Used.
- D. Source Quality Control:
Not Used.

608—1.03 SUBMITTALS

Not Used.

608—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

608—2.00 PRODUCTS

608-2.01 MATERIALS STANDARDS

- A. General:

Materials shall conform to the requirements specified in the following:

Joint Fillers	705—2.01
Reinforcing Steel	709—2.01
Bed Course Material	703—2.03

Concrete for sidewalks shall conform to the requirements of Section 501, Structural Concrete, Class A.

Asphalt material for sidewalks shall conform to the requirements of Section 401, Plant Mix Asphalt Pavement.

Concrete and asphalt mixes will be subject to inspection and tests at the mixing plants for compliance with specifications requirements.

608—3.00 EXECUTION

608—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is completed to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

608—3.02 INSTALLATION

A. Concrete Sidewalks:

Excavation: Excavation shall be made to the required depth and to a width that will permit the installation and bracing of the forms. The foundations shall be shaped and compacted to a firm, even surface conforming to the section shown on the plans. All soft and yielding material shall be removed and replaced with acceptable material. Bed course material shall be thoroughly compacted.

Forms: Forms shall be of wood or metal and shall extend for the full depth of the concrete. All forms shall be straight, free from warp and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain both horizontal and vertical until their removal.

Placing: The foundation shall be thoroughly moistened immediately prior to the placing of the concrete.

Finishing: Shall conform to the requirements of Section 501. The surface shall be finished with a wooden float and textured with a broom. Plastering of the surface shall not be permitted.

All outside edges of the slab and all joints shall be edged with a one-quarter inch (1/4") radius edging tool.

Joints: Expansion joints shall have the dimensions specified, and shall be filled with the type of pre0molded expansion joint filler noted. The sidewalk shall be divided into sections by dummy joints formed by a jointing tool or other acceptable means as directed. These dummy joints shall extend into the concrete for at least one-third (1/3) of the depth and shall be approximately one-eighth inch (1/8") wide.

Construction joints shall be formed around all appurtenances, such as manholes, utility poles, etc., extending into and through the sidewalk. Pre-molded expansion joint filler one-quarter inch (1/4") thick shall be installed in these joints. Expansion joint filler of the thickness indicated shall be installed between concrete sidewalks and any fixed structure such as a building or bridge. This expansion joint material shall extend for the full depth of the walk.

Curing: Concrete shall be cured at least seventy—two (72) hours. During this period, the use of vibratory compaction equipment shall not be permitted within 100 feet of the concrete. Curing shall be by means of moist burlap or mats or other approved methods. During the curing period all traffic, both pedestrian and vehicular, shall be excluded. Vehicular traffic shall be excluded for such additional time as the Engineer may direct.

B. Asphalt Sidewalks:

Bed Course: Bed course material shall be placed in layers and shall be thoroughly compacted.

Placing: Asphalt sidewalk material shall be placed on the compacted bed course in one or more courses as indicated so as to give the required depth when rolled. Compaction shall be accomplished by means of a hand operated, or power, roller of an acceptable type and weight. In areas inaccessible to the roller, hand tamping will be permitted. In any case, the asphalt sidewalk material shall be uniformly compacted.

608—4.00 MEASUREMENT AND PAYMENT

608—4.01 GENERAL

- A. Concrete sidewalks will be measured by square yard of finished surface for the depth specified. Asphalt sidewalks will be measured by the ton of asphalt mixture placed, or by the square yard. Bed course material will be measured by the ton or by the cubic yard as provided for under Section 203.

608—4.02 MEASUREMENT

Concrete sidewalks, concrete curb cuts, and remove and replace 6" concrete driveway, will be measured by the square yard of finished surface for the depth specified. Existing sidewalk and curb will be sawcut at specified locations.

608—4.03 PAYMENT

The accepted quantity shall be paid for at the contract price per unit of measurement, for each of the particular pay items shown in the bid schedule, complete in place, including excavation. Bed course material shall be paid for as crushed aggregate base as provided for in Section 301—4.03.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
608(1A)	4" Concrete Sidewalk	Square Yard
608(1B)	6" Concrete Curb Cut	Square Yard
608(1C)	Remove & Replace 6" Concrete Driveway	Square Yard
608(2)	Asphalt Sidewalk	Ton
608(3)	Asphalt Sidewalk	Square Yard

Backfill, reinforcement, expansion joint material and other related miscellaneous items will not be paid for separately but shall be incidental.

When more than one depth of sidewalk appears for a pay item, numeral suffixes will be included within the parentheses to differentiate between depths.

END OF SECTION

SECTION 609 CURBING

609—1.00 GENERAL

609—1.01 DESCRIPTION

- A. This work shall consist of the construction of curb, gutter or combination curb and gutter in conformance with the plans.

The types of curbing are designated as follows:

Type 1	Cast in place concrete curb
Type 2	Pre—cast concrete curb
Type 3	Asphalt curb

- B. Related Work Described Elsewhere:

Not Used.

- C. Work Installed but Furnished Under Other Directives:

Not Used.

- D. Work Furnished but Not Installed:

609—1.02 QUALITY ASSURANCE:

- A. Qualifications of Manufacturers:

Not Used.

- B. Qualifications

Not Used.

- C. Codes and Standards:

Not Used.

- D. Source Quality Control:

Not Used.

609—1.03 SUBMITTALS

Not Used.

609—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

609—2.00 PRODUCTS

609—2.01 MATERIALS STANDARDS

A. General:

Except as provided below the materials used shall conform to the following requirements:

Pre—cast Concrete Curb	712—2.04
Bed Course Material	703—2.03
Joint Filler	705—2.01
Reinforcing Steel	709—2.01
Joint Mortar	705—2.03

Concrete shall conform to the requirements of Section 501, Structural Concrete, Class A.

Asphalt material for curbing shall conform to the requirements of Section 401, Plant Mix Asphalt Pavement.

609—3.00 EXECUTION

609—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are not conflicts with existing utilities prior to the start of work

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

609—3.02 INSTALLATION

A. Cast in Place Concrete Curbing:

Excavation: Excavation shall be made to the required depth, and the base upon which the curb is to be set shall be compacted to a firm, even surface.

Forms: Forms shall be of wood or metal, straight, free from warp and of such construction that there will be no interference to the inspection of grade or alignment. All forms shall extend for the entire depth of the curb and shall be braced and secured sufficiently so that no deflection from alignment or grade will occur during the placing of the concrete.

Mixing and Placing: Compaction of concrete placed in the forms shall be by vibration or other acceptable methods. Forms shall be left in place until the concrete has set sufficiently so that they can be removed without damage to the concrete. Immediately upon removal of the forms, the exposed face shall be rubbed to a uniform surface. No plastering will be permitted.

Sections: Curb shall be constructed with weakened plane contraction joints spaced at 10 feet maximum intervals. These joints shall consist of 1/8 inch wide by 1 inch deep minimum slot continuous across the top and down the sides of the section. The slot shall be edged with a 1/4 inch radius edging tool.

Curing: Concrete shall be cured for at least seventy—two (72) hours. Curing shall be by means of moist burlap or mats or other approved methods. During the curing period all traffic, both pedestrian and vehicular, shall be excluded. Vehicular traffic shall be excluded for such additional time as the Engineer may direct. During the cure period, the use of vibratory compaction equipment shall not be permitted within 100 feet of the concrete.

Backfilling: After the concrete has set sufficiently, the spaces in front and back of the curb shall be refilled to the required elevation with specified material, which shall be thoroughly compacted.

Curb Machine: Subject to approval, the curb may be constructed by the use of an approved curb forming machine.

When a straight edge, ten feet (10') long, is laid on the top or face of the curb, or on the surface of gutters, the surface shall not vary more than 0.02 foot from the edge of the straight edge except at grade changes or curves. The Contractor shall clean, at his expense, all discolored concrete.

Repairs shall be made by removing and replacing the entire unit between scoring lines and joints.

Finishing shall conform with Section 501 and the standard detail.

B. Pre—Cast Concrete Curb:

The installation of pre—cast concrete curb shall conform to the following requirements:

1. Excavation shall be made to the required depth, and the base upon which the curb is to be set shall be compacted to a firm, even surface.
2. The curb shall be set so that the front top line conforms to the line and grade required.
3. Curb shall be laid with joints as close as possible. These joints shall be filled with mortar if specified.
4. **Backfilling:** After the curb has been set, any remaining excavated areas shall be filled with specified material and thoroughly compacted.

C. Asphalt Curb:

1. **Preparation of Bed.** When the curb is to be constructed on a cured or aged portland cement concrete base, asphalt pavement or asphalt treated base, the bed shall be

thoroughly swept and cleaned by compressed air. The surface shall be thoroughly dried and, immediately prior to the placement of the asphalt mixture, shall receive a tack coat of asphalt material of the approved type and grade.

2. Placing. Asphalt curb shall be constructed by use of a self—propelled automatic curber or curb- machine or a paver with curbing attachments.

The automatic curber or machine shall be approved prior to its use and shall conform to the following requirements:

- a. The weight of the machine shall be such that required compaction is obtained without the machine riding above the bed on which curb is constructed.
 - b. The machine shall form curb that is uniform in texture, shape and density.
 - c. Construction of curb by means other than the automatic curber or machine may be permitted when short sections or sections with short radii are required. The resulting curb shall conform in all respects to the curb produced by the use of the machine.
3. Painting and sealing, if required, shall be performed only on a curb which is clean and dry and which has reached the ambient temperature.

D. Pre—Cast Concrete Bumper Block:

The installation of pre—cast concrete bumper blocks shall conform to the following requirements:

1. Excavation shall be made which the curb is to be surface such that the contact with the surface to the required depth, and the base upon set shall be compacted to a firm, even blocks may be installed with uniform at the specified elevation.
2. The blocks shall be set to the required line and grade and anchored as specified in the plans.

All concrete bumper blocks shall be constructed to the dimensions as shown on the plans utilizing Class A Concrete and delivered and installed in such a way that no cracks or other appearance defects occur.

609—4.00 MEASUREMENT AND PAYMENT

609—4.01 GENERAL

Not Used.

609—4.02 MEASUREMENT

Curbing will be measured by the linear foot along the foot face of the section at the finished grade elevation. Combination curb and gutter will be measured along the face of the curb. No deduction in length will be made for drainage structures installed in the curb.

Bed course material will be measured by the ton or by the cubic yard as provided for under Section 203.

609—4.03 PAYMENT

The accepted quantity shall be paid for at the contract unit price for each of the particular pay items shown in the bid schedule, complete in place.

Bed course material will be paid for as provided in Section 203.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
609(1)	Curb Type _____	Linear Foot
609(2)	Curb and Gutter Type _____	Linear Foot
609(3)	Asphalt Curb	Linear Foot
609(4)	Concrete Bumper Block	Linear Foot
609(5)	Valley Gutter	Linear Foot

END OF SECTION

SECTION 611 RIPRAP

611—1.00 GENERAL

611—1.01 DESCRIPTION

A. Work Included:

This work shall consist of furnishing and placing a protective covering of stone as shown on the plans or as established.

B. Related Work Described Elsewhere:

Not Used.

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

611—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used.

C. Codes and Standards:

ASTM C-535 ABRASION

D. Source Quality Control:

Not Used.

611—1.03 SUBMITTALS

Not Used.

611—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

611—2.00 PRODUCTS

611-2.01 MATERIALS STANDARDS

A. General:

Stone for this work shall be hard angular quarry stones and have a percentage of wear of not more than fifty (50) at five hundred (500) revolutions as determined by ASTM C—535. The least dimension of any piece of stone shall be not less than one-quarter (1/4) its greatest dimension.

B. Materials:

Stones shall meet the following gradation requirement for the class specified:

Class I

No more than 10 percent of the stones by total weight shall weigh more than 50 pounds per piece and no more than 20 percent by total weight of the stones shall weigh less than 25 pounds apiece.

Class II

No more than ten percent (10%) of the stones by total weight shall weigh more than four hundred (400) pounds per piece and not more than fifteen percent (15%) by weight of the stones shall weigh less than twenty-five (25) pounds per piece. The stones shall be evenly graded and a minimum of fifty percent (50%) by weight of the stones shall weigh two hundred (200) pounds or more per piece.

Class III

No more than ten percent (10%) of the stones by total weight shall weigh more than one thousand, four hundred (1,400) pounds per piece and no more than fifteen percent (15%) of the stones shall weigh less than twenty-five (25) pounds per piece. The stones shall be evenly graded and a minimum of fifty percent (50%) by weight of the stones shall weigh seven hundred (700) pounds or more per piece.

611—3.00 EXECUTION

611—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

611—3.02 INSTALLATION

A. Construction Requirements:

A footing trench shall be excavated along the toe of the slope when shown on the plans. The stones shall be handled or dumped into place so as to secure a stone mass of the thickness height and length shown on the plans, or as staked with a minimum of voids.

Undesirable voids shall be filled in with small stones or spalls. The rock shall be manipulated sufficiently by means of a bulldozer, rock tongs or other suitable equipment to secure a reasonably regular surface and mass stability.

Riprap protection shall be placed to its full course thickness at one operation and in such manner as to avoid displacing the underlying material. Placing of riprap protection in layers or by dumping into chutes or by similar methods likely to cause segregation will not be permitted.

All material going into riprap protection shall be placed and distributed so that there will be no large accumulation or area composed largely of either the larger or smaller sizes of stone.

Unless otherwise authorized, the riprap protection shall be placed in conjunction with the construction of the embankment with only sufficient lag in construction of the riprap protection as may be necessary to prevent mixture of embankment and riprap material.

The Contractor shall provide a level compact area of sufficient size to dump and sort typical loads of riprap at approved location(s). He! She shall further dump loads specified in this area and assist the Engineer as needed to sort and measure the stones in the load for the purpose of determining if the riprap is within specifications. Mechanical equipment which is needed to assist in this sorting shall be provided by the Contractor at no additional cost to the Owner

611—4.00 MEASUREMENT AND PAYMENT

611—4.01 GENERAL

Not Used.

609—4.02 MEASUREMENT

The quantity of riprap to be paid for shall be the number of cubic yards measured by neat line measure, or tons completed and accepted in place.

611—4.03 PAYMENT

The accepted quantity of riprap will be paid for at the contract price per unit of measurement respectively, for each particular pay item listed below that as shown in the bid schedule, complete in place.

When more than one class of riprap is specified for any pay item, letter suffixes shall be included within the parentheses of the item numbers in order to differentiate between the different classes.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
611(1)	Riprap, Class _____	Cubic Yard
611(2)	Riprap, Class _____	Ton

Excavation and backfill required for placement of riprap will not be paid for directly, but will be considered incidental.

END OF SECTION

SECTIONS 612 and 613

RESERVED

SECTION 614 SURVEY MONUMENTS AND MONUMENT CASES

614—1.00 GENERAL

614—1.01 DESCRIPTION

A. Work Included:

This work consists of furnishing and installing survey monuments and monument cases in conformance with the plans or as directed. If shown on the plans, the work shall include the adjusting of existing monuments and monument cases to conform to the new elevations.

The words “monument case” and “monument base and case” shall be interchangeable.

B. Related Work Described Elsewhere:

Not Used.

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work furnished but Not Installed:

Not Used.

614—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used.

C. Codes and Standards:

Not Used.

D. Source Quality Control:

Not Used.

614—1.03 SUBMITTALS

Not Used

614—1.04 PRODUCT/MATERIAL HANDLING

Not Used

614—2.00 PRODUCTS

614—2.01 MATERIALS STANDARDS

A. General:

Not Used.

B. Materials:

The monument case shall be IFCO Foundry No. 701 or equal. The brass cap shall be 2” across suitable for setting in concrete.

614—3.00 EXECUTION

614—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

614—3.02 INSTALLATION

A. General:

Each monument and monument case shall be set accurately to lines established at the required location and in such a manner as to insure its being held firmly in place. Existing monuments and monument cases to be adjusted to new elevations shall be set in the manner and at the elevations directed.

614—4.00 MEASUREMENT AND PAYMENT

614—4.01 GENERAL

Not Used.

614-4.02 MEASUREMENT

The quantity to be paid for shall be the actual number of survey monuments and monument cases furnished, installed or adjusted to new elevation, and accepted.

Survey monuments that are placed on bridges shall not be measured for payment.

614—4.03 PAYMENT

The accepted quantities shall be paid for at the contract price per unit of measurement, for each of the particular pay items shown in the bid schedule.

Survey monuments placed on bridges shall not be paid for directly, but shall be considered incidental.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
614(1)	Survey Monuments	Each
614(2)	Monument Base and Case	Each
614(3)	Adjust Existing Monuments and Cases	Each
614(4)	Adjust Existing Monument Cases	Each

END OF SECTION

SECTION 615 STANDARD SIGNS

615—1.00 GENERAL

615—1.01 DESCRIPTION

A. Work Included:

This work shall consist of furnishing and installing standard signs, guide markers, object markers, and mile posts. The sign location and type of installation will be as shown on the plans or as designated. Work under this section shall also include removal and relocation, as well as removal and disposal, of existing signs, mile posts and markers.

B. Related Work Described Elsewhere:

Section 115 Traffic Maintenance

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

615—1.02 QUALITY ASSURANCE:

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used.

C. Codes and Standards:

Not Used.

D. Source Quality Control:

Not Used.

615—1.03 SUBMITTALS

Not Used.

615—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

615—2.00 PRODUCTS

615—2.01 MATERIALS STANDARDS

A. General:

All sign materials shall conform to Section 730.

B. Materials:

1. All standard regulatory, warning, and guide signs for permanent installation shall be fabricated with Type I Level A (encased lens) reflective sheeting and single—span aluminum panels unless otherwise designated on the plans.
2. All orange construction and maintenance signs shall be fabricated with Type II (encapsulated lens) reflective sheeting and either single—span sheet aluminum or plywood panels.
3. All new standard signs for permanent installation shall be of new materials. All sign layouts, if not shown on the plans, shall be in accordance with “Alaska Sign Design Specifications”. Any sign delivered or installed which does not conform to these specifications shall be replaced by the Contractor at no additional cost to the City.
4. Concrete for light sign structure embedment shall conform to Section 501, for Class W Concrete, or an approved, premixed, sacked concrete.

615—3.00 EXECUTION

615—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

All materials and finished signs are subject to inspection and acceptance in place. All surfaces exposed to weathering shall be free of any defects in the coating that may impair the serviceability or detract from the general appearance or color match. The finished signs shall be free of any defects in the coating that may impair the serviceability or detract from the general appearance or color match. The finished signs shall be clean and free from all chatter marks, burrs, sharp edges, loose rivets, delaminated reflective sheeting and aluminum marks. No repairs shall be made to the face sheet. All signs not conforming to these specifications shall be rejected.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

615—3.02 INSTALLATION

Construction Requirements:

1. Wooden posts shall be placed in excavated holes. Metal posts may be driven, provided the method of driving does not damage the post. Depth of embedment shall be as shown on the plans unless otherwise directed.
2. The space around the posts in holes shall be backfilled to finish ground with selected earth or sand, free of rocks or deleterious material, placed in layers approximately six to twelve inches (6—12”) thick, and thoroughly compacted.
3. Surplus excavated material shall be disposed of along the adjacent roadway as directed.
4. Guide Marker reflectors shall be installed after the posts have been set in place.
5. Sign panels shall be attached to posts, electroliers, traffic signal standards, bridge rails, piers, and abutments with fastening hardware of the types and sizes shown on the plans. All fastening hardware shall be furnished by the Contractor.
6. Existing signs and mile posts that are removed and relocated shall conform to the details shown on the plans or as directed.
7. All existing sign panels, posts, and hardware designated for salvage shall be returned to the City of Fairbanks, Public Works Department, 2121 Peger Road.
8. Sign relocation shall consist of removing and reinstalling signs as shown on the plans. The Contractor shall replace or repair signs damaged during the removal or reinstallation operations at no cost to the Owner. Reinstall signs as directed by the Engineer. The final installation shall be of quality equal to, or better than, the original installation. See the Appendix for the Signing Schedule.

615—4.00 MEASUREMENT AND PAYMENT

615—4.01 GENERAL

Not Used.

615—4.02 MEASUREMENT

The quantity of Standard Regulatory, Warning and Guide Signs for permanent installation to be paid for shall be the total square footage of legend bearing sign panel erected in place. No deductions in quantity for corner rounding shall be made. Nominal dimensions for sign sizes indicated on the plans shall be used for the purpose of calculating sign pay quantities. Standard construction and maintenance signs erected as provided in Section 115 shall not be measured for payment under this section.

Removal and relocation of existing signs shall be measured per each sign, completed and accepted in final position. Sign components damaged or destroyed due to the Contractor’s operation shall be

replaced by the Contractor at no additional expense to the City. Object Markers and Guide Markers shall be measured per each, complete in place. One (1) post equipped with two (2) reflectors shall be considered a single marker.

All other equipment, hardware, and appurtenances shall be considered incidental to the Pay Item "Standard Sign". When signs are removed or relocated, the word "sign" shall mean all placards and the mounting post.

615-4.03 PAYMENT

Items of work measured in accordance with Section 615—4.02 will be paid for at the contract unit price bid per unit of measurement complete in place.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
615(1)	Standard Sign	Square Foot
615(2)	Remove and Relocate Existing Signs	Each
615(3)	Remove and Relocate Mile Posts	Each
615(4)	Object Markers	Each
615(5)	Guide Markers	Each

END OF SECTION

SECTIONS 616 and 617

RESERVED

SECTION 618 SEEDING

618—1.00 GENERAL

618—1.01 DESCRIPTION

A. Work Included:

This work shall consist of preparing the ground, followed by application of seed and fertilizer, in conformance with the plans or as established.

It is the intent of this work that a living vegetative cover will be provided in the areas indicated on the plans and maintained for the term of the contract.

B. Related Work Described Elsewhere:

Not Used.

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

618—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

All seeding application and maintenance shall be performed by a specialty Contractor licensed as a Landscaping Contractor.

C. Codes and Standards:

Not Used.

D. Source Quality Control:

Not Used.

618—1.03 SUBMITTALS

Not Used.

618—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

618—2.00 PRODUCTS

618—2.01 MATERIALS STANDARDS

A. General:

Not Used.

B. Materials:

Materials shall conform to the requirements specified in the following:

Seed	724
Fertilizer	725
Limestone	725
Mulch	727

618—3.00 EXECUTION

618—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in areas of the discrepancy until all such discrepancies have been fully resolved.

618—3.02 INSTALLATION

A. Soil Preparation:

On slopes steeper than 3:1, depth of cultivation may be reduced as directed. All cultivated areas shall be raked or cleared of stones two inches (2") in diameter and larger, and all weeds, plant growth, sticks, stumps and other debris or irregularities which might interfere with the seeding operation, growth of grass, or subsequent maintenance of the grass covered areas shall be removed.

B. Seeding Seasons:

All seeding shall be performed between the dates specified in the Special Provisions.

No seeding shall be done during windy conditions or when climatic conditions or ground conditions would hinder placement or proper growth.

C. Application Methods:

Seed, ground limestone, mulch, and fertilizer may be placed by the following methods:

1. Hydraulic Method:

- a. Seeding by hydraulic methods shall consist of furnishing and placing a slurry made of seed, fertilizer, water, and other components as required by the Special Provisions.
- b. If required, the dried peat moss, or cellulose wood fiber, and limestone shall be added to the water slurry in the hydraulic seeder after the proportionate amounts of seed and fertilizer have been added. The slurry mixture shall then be combined and applied in such a manner that the rate of application will result in an even distribution of all materials.
- c. Hydraulic seeding equipment shall be capable of maintaining a continuous agitation so that a homogeneous mixture can be applied through a spray nozzle. The pump shall be capable of producing sufficient pressure to maintain a continuous, non—fluctuating spray capable of reaching the extremities of the seeding area with the pump unit located on the road bed. Sufficient hose shall be provided to reach areas not practical to seed from the nozzle unit situated on the road bed.
- d. Seed shall not be placed in the slurry prior to twenty (20) minutes before application.

2. Dry Methods:

- a. Mechanical spreaders, seed drills, landscape seeders, culti-packer seeders, fertilizer spreaders or other approved mechanical spreading equipment may be used when seed, fertilizer and ground limestone are to be applied in dry form.
- b. Fertilizer and limestone shall be spread separately at the specified rates.

3. Aerial Methods:

- a. Application of seed and fertilizer may be applied in dry form by aerial methods.
- b. Fertilizer shall be spread separately from the seed. All aerial applications of seed and fertilizer shall be made when the ground is moist, and where preparatory cultivation and post-compaction is not required.

4. Application Rates:

- a. Application rates of seed, fertilizer and other components, as required, shall be as set forth in the Special Provisions.

D. Maintenance of Seeded Areas:

The Contractor shall protect seeded areas against traffic by approved warning signs or barricades. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading, reseeding and remulching, as directed, and the Contractor shall otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

The seeded areas shall be watered by the Contractor as required for proper germination and growth. Equipment shall be capable of watering all seeded areas from the traveled way.

After the initial growth has been established, all seeded areas shall receive an application of fertilizer at the time and rate specified in the special provisions.

Seeded areas not showing evidence of satisfactory growth shall be reseeded, as directed, during the second application of fertilizer.

The seeded area shall be maintained by the Contractor until two cuttings have been accomplished by the Contractor at two inches in grass height and the grass is uniform in appearance with a healthy green color.

618—4.00 MEASUREMENT AND PAYMENT

618—4.01 GENERAL

Not Used.

618—4.02 MEASUREMENT

The quantity of seeding shall be the number of one thousand (1,000) square foot units; or, the number of acres seeded, measured on the ground surface; or, the number of pounds of seed seeded, all at the specified application rate.

Water used in maintenance of seeded areas shall be measured by the one thousand gallon (M Gal.) units, by means of calibrated tanks or distributors, accurate water meters or by weighing. The conversion factor of 62.4 pounds/7.48 gallons shall be used in converting weights to gallons. Only water used for maintenance designated for seeding will be measured for payment.

When hydraulic seeding methods are used, mixing water for the hydraulic application will not be measured for the payment.

The second application of fertilizer and any required reseeding shall not be measured for payment.

618—4.03 PAYMENT

The accepted quantity shall be paid for at the contract unit price per unit of measurement for the pay Items listed below that appear on the bid schedule.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
618(1)	Seeding	1,000 Square Feet
618(2)	Seeding	Acre
618(3)	Seeding	Pound
618(4)	Water for Maintenance	M Gal (1,000 Gal.)
618(5)	Limestone	Ton

No extra compensation will be paid to the Contractor for any work incurred for maintenance of seeded areas.

END OF SECTION

SECTION 619

RESERVED

SECTION 620 TOPSOIL

620—1.00 GENERAL

620—1.01 DESCRIPTION

A. Work Included:

This work shall consist of furnishing, spreading, and compacting topsoil in conformance with the plans.

B. Related Work Described Elsewhere:

Not Used.

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

620—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used.

C. Codes and Standards:

Not Used.

D. Source Quality Control:

Not Used.

620—1.03 SUBMITTALS

Not Used.

620—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

620—2.00 PRODUCTS

620—2.01 MATERIALS STANDARDS

A. General:

Topsoil shall conform to the requirements of Section 726.

620—3.00 EXECUTION

620—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

620—3.02 INSTALLATION

A. Placing:

The topsoil shall be evenly spread on the designated areas to a depth which, after settlement and compaction, shall be that shown on the plans. Spreading shall not be done when the ground, or topsoil, is frozen, excessively wet or otherwise in a condition detrimental to the work. The roadway surfaces shall be kept clean of topsoil during hauling and spreading operations.

After spreading has been completed, large clods, stones, roots, stumps, and other litter shall be removed.

Any excavation or grading necessary to allow spreading of topsoil at the required thickness to the line and grade specified shall be incidental to the Topsoil Bid Item.

All topsoil shall be spread and compacted with a roller evenly to the lines and grades specified by the Engineer.

B. Maintenance and Repair:

The Contractor shall maintain the areas covered by topsoil until subsequent seeding, or landscaping, is accomplished. Any repair or replacement of topsoil, including damage or loss resulting from winter shut—down, shall be done at the Contractor's expense.

620—4.00 MEASUREMENT AND PAYMENT

620—4.01 GENERAL

Not Used.

620—4.02 MEASUREMENT

Measurement will be the number of units of one thousand (1,000) square feet measured on the slope of the ground surface. Stockpiling and rehandling of topsoil during the stripping operations, or during placement shall not be measured for payment. Repair, maintenance and replacement of topsoil shall not be measured for payment.

620—4.03 PAYMENT

The accepted quantity of topsoil shall be paid for at the contract price per unit of measurement, complete in place.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
620(1)	6" Topsoil	1,000 Square Feet

END OF SECTION

SECTIONS 621 - 624

RESERVED

SECTION 627 WATERING

627-1.00 GENERAL

627-1.01 DESCRIPTION

A. Work Included:

This work shall consist of developing a water supply for all water required for the work and of furnishing, hauling and placing water for dust control.

B. Related Work Described Elsewhere:

Not Used.

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

627-1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used

C. Codes and Standards:

Not Used

D. Source Quality Control:

Not Used

627—1.03 SUBMITTALS

Not Used.

627—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

627—2.00 PRODUCTS

627—2.01 MATERIALS STANDARDS

A. General:

Not Used.

627—3.00 EXECUTION

627—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

627—3.02 INSTALLATION

A. General:

All dust control operations for which payment is to be made shall be performed by the Contractor. The applicance of water shall be under the control of the Engineer.

627-4.00 MEASUREMENT AND PAYMENT

627—4.01 GENERAL

Not Used.

627—4.02 MEASUREMENT

The quantity of water to be measured for payment shall be the number of 1,000 gallon (M Gal.) units measured by approved meter or in the vehicle at the point of delivery on the road and used as directed.

627—4.03 PAYMENT

The contract price paid per M Gal. unit shall be full compensation for developing the water supply, furnishing, hauling, and placing all water for dust control as directed.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
627(1)	Watering	M Gal.

Where Item 627(1) does not appear in the bid schedule, the work required for this item will not be paid for directly, but shall be considered incidental.

END OF SECTION

SECTIONS 629 - 634

RESERVED

SECTION 635 INSULATION BOARD

635—1.00 GENERAL

635—1.01 DESCRIPTION

A. Work Included:

This work shall consist of furnishing and installing polystyrene insulation board in conformance with the plans.

B. Related Work Described Elsewhere:

Section 203 Excavation and Embankment.

C. Work Installed but Furnished Under Other Directives:

Not Used.

D. Work Furnished but Not Installed:

Not Used.

635—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used.

B. Qualifications of Installers:

Not Used

C. Codes and Standards:

Not Used.

D. Source Quality Control:

Not Used.

635—1.03 SUBMITTALS

Not Used.

635—1.04 PRODUCT/MATERIAL HANDLING

Not Used.

635—2.00 PRODUCTS

635—2.01 MATERIALS STANDARDS

A. General:

Not Used.

B. Materials:

The insulation boards shall be the specified thickness, and conform to the requirements of AASHTO M 230.

635—3.00 EXECUTION

635—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

635—3.02 INSTALLATION

A. General:

1. Prior to the placing of the insulation board, the area shall be bladed, shaped and compacted in accordance with Section 203. Each board shall be set accurately to the line and grade established and in such a manner as to insure its being held firmly in place by driving a minimum of two (2) one—quarter inch by eight inch (1/4" x 8") wood dowels per panel. Insulation shall be placed, to the required thickness, using a minimum of two (2) layers. All joints in the first layer and second layer shall be staggered.
2. The insulation board shall be covered with approved material of two inch (2") maximum size, end dumped in a one foot (1') lift, and spread and compacted for the full width of the insulation layer prior to the placing subsequent lifts. Spreading and compacting equipment shall be approved prior to its use.
3. Conventional construction equipment shall be allowed to operate on the compacted lift.

635-4.00 MEASUREMENT AND PAYMENT

635-4.01 GENERAL:

Not Used

635—4.02 MEASUREMENT

The quantities to be paid for shall be the number of one thousand board foot measure (MBM) units of insulation board, complete and accepted.

635—4.03 PAYMENT

The quantities shall be paid for at the contract price per unit of measurement for the pay item listed below when shown in the bid schedule.

Payment will be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
635(1)	Insulation Board	MBM

END OF SECTION

SECTIONS 636 - 660

RESERVED

SECTIONS 662 - 669

RESERVED

SECTION 670 TRAFFIC MARKINGS

670—1.00 GENERAL

670—1.01 DESCRIPTION

A. Work Included:

This work shall consist of furnishing all materials and placing painted traffic markings and applying glass spheres thereto, thermoplastic traffic markings and raised pavement markers. All work shall be in accordance with these specifications and the applicable portions of the manual on Uniform Traffic Control Devices with Alaska Supplement. Traffic markings shall be placed at the locations shown on the plans.

B. Related Work Described Elsewhere:

1. Section 115 Traffic Maintenance
2. Section 615 Standard Signs

C. Work Installed but Furnished Under Other Directives:

Not Used

D. Work Furnished but Not Installed:

Not Used

670—1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

Not Used

B. Qualifications of Installers:

Not Used

C. Codes and Standards:

Not Used

D. Source Quality Control:

Not Used

670—1.03 SUBMITTALS

Not Used

670—1.04 PRODUCT/MATERIAL HANDLING

Not Used

670—2.00 PRODUCTS

670-2.01 MATERIALS STANDARDS

A. Materials:

Traffic line paint shall conform to Section 708—2.03.

Glass spheres for reflectorizing traffic line paint shall conform to Section 712—2.08.

Materials for thermoplastic pavement markings shall conform to Section 712—2.14.

Raised Pavement Markers.

1. The iron casting for the raised pavement markers shall be constructed of modular iron, conforming to Specification ASTM A 536 77.
2.
 - a. Reflectors for the raised pavement markers shall consist of an acrylic plastic shell filled with tightly adherent potting compound, the shell shall contain one or two prismatic reflective faces as called for on the plans to reflect incident light from a single or opposite directions. A metal cover shall be bounded to the upper surface for the reflector to provide protection against studded tires.
 - b. The shell shall be molded of methyl methacrylate conforming to the Federal Specification L-P-380A, Type I, Class 3. Filler shall be a potting compound selected for strength, resilience, and adhesion adequate to pass the necessary physical requirements.
 - c. The optical performance of the reflector shall be such that the specific intensity of each crystal reflecting surface at 0.2 degrees observation angle shall be not less than the following when incident light is parallel to the base of the reflector.

Horizontal Entrance Angle	Specific Intensity
0 degrees	2.5 degrees
20 degrees	1.0 degrees

- d. For yellow reflectors, the specific intensity shall be 60% of the value for crystal. For red reflectors the specific intensity shall be 25% of the value for crystal.

670—3.00 EXECUTION

670—3.01 CONDITIONS

A. Inspection:

Prior to all work in this section, carefully inspect all the installed work and verify that all such work is complete to the point where this installation may properly commence.

Verify that all work can be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.

Verify that there are no conflicts with existing utilities prior to the start of work.

B. Discrepancies:

In the event of a discrepancy, immediately notify the Engineer in writing.

Do not proceed with installation in the areas of the discrepancy until all such discrepancies have been fully resolved.

670—3.02 INSTALLATION

A. General:

This work shall be done as soon as possible after paving is completed to facilitate traffic.

B. Paint Color:

All pavement marking shall conform to the colors shown on the plans.

C. Preparation of Surface:

Paint shall not be applied to pavements which are dirty, damp, or cold. Paint shall not be applied when the pavement temperature is less than 40 degrees F.

All dirt, oil, grease, and other foreign matter shall be removed from the areas of the pavement upon which the traffic markings are to be painted by an approved method.

D. Types of Lines:

The type and color of the lines shall be as shown on the plans.

E. Width of Lines:

The width and spacing of all lines shall be as shown on the plans.

F. Application:

1. The paint shall be applied with atomizing spray type striping machine, approved by the Engineer. The markings shall have clear—cut edges, true and smooth alignment and uniform film thickness shall be 17 mils with a nominal variation not to exceed 2 mils.

The wet film thickness of the in—place paint shall be measured as follows:

Convenient to the location where the road service lines will be placed, test lines shall be laid to adjust the pavement marking machine. In the path of the test line laid without glass spheres, place a weighted sheet of aluminum foil 18 by 11 inch, thumbtacked to a 3/4 inch plywood board. Immediately after the motorized striper (spraying a 4 inch strip along the 18 inch dimension of aluminum foil) passes over the aluminum foil, quickly roll it up, slip an electric band over the roll, and weigh it

to the nearest 0.1 g. within 30 sec. From the net weight of paint on the foil and the weight per gallon of the sample, calculate the film thickness using the following formula.

$$\begin{aligned} \text{Film thickness, inc.} &= \frac{A \times 231}{453.6 \times 18 \times 4 \times B} \\ &= \frac{A \times 0.007073}{B} \end{aligned}$$

Where: A = weight of paint on foil in grams.
B = weight per gallon of sample in pounds

2. Thermoplastic.

- a. The preparation of the existing pavement prior to the installation of the thermoplastic shall be done in accordance with manufacturer recommendations and be incidental to Scope of Work.
- b. Thermoplastic pavement markings shall be applied prior to the final rolling of the new asphaltic surface. It shall be rolled into final position with conventional steel wheeled pavement rollers. The minimum pavement temperature at the time of rolling the markings shall be 120°F. The plastic and adhesive on the pavement marking material shall be of the type that the water used on the pavement roller to prevent asphalt pickup shall not be harmful to the successful application of the plastic marking material.

3. Glass Beads:

Glass beads shall be applied over the wet painted stripes in a uniform pattern at the rate of five pounds of glass beads per gallon of paint. The bead dispensers shall be of a type that will mechanically and automatically give such performance. Glass beads shall be applied to all painted traffic markings by the drop—on method.

G. Paint Removal:

Traffic stripes and pavement markings to be removed shall be as designated.

Pavement markings shall be removed to the fullest extent possible from the pavement by any method that does not materially damage the surface or texture of the pavement or surfacing. Sand or other material deposited on the pavement as a result of removing traffic stripes and markings shall be removed as the work progresses. Accumulations of sand or other material which might interfere with drainage or might constitute a hazard to traffic will not be permitted.

Pavement marking no longer applicable which may create confusion in the minds of motorists shall be removed or obliterated before any change is made in the traffic pattern.

Pavement markings shall be removed by such methods that will cause the least possible damage to the pavement or surfacing. Any damage to the pavement or surfacing caused by pavement marking removal shall be repaired by the Contractor at his expense by acceptable methods.

Where blast cleaning is used for the removal of pavement markings or for removal of objectionable material, and such removal operations is being performed within 10 feet of a lane occupied by public traffic, the residue, including dust shall be removed immediately after contact between the sand and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the blast cleaning operation, or by other approved methods.

H. Preliminary Spotting:

The Contractor will provide the necessary control points at intervals including all changes of direction and changes in the basic configuration of striping such as at the beginning and ending of no passing zones on a two—way, two—lane roadway. These points shall be used in preliminary spotting of lines before striping is commenced. The Contractor shall be responsible for preliminary spotting of the lines to be painted and he must obtain approval for all his spotting before striping may begin. Preliminary spotting is required for all longitudinal striping.

I. Tolerances for Lane Striping:

The Contractor shall keep his work within the following allowable tolerances:

1. Length of stripe. The longitudinal error within a 40 foot length of lane line shall not be more than plus or minus 6 inches.
2. Width of stripe. The width of stripe shall not vary more than plus or minus 1/2 inch.
3. The lane width defined from the face of curb to center of lane line or between centers of adjacent lane lines shall not vary from the widths shown on the plans by more than plus or minus two inches.

670—4.00 MEASUREMENT AND PAYMENT

670—4.01 GENERAL

Payment for traffic markings will not be made until the markings are completely in place.

670—4.02 MEASUREMENT

Measurement will be by one of the following methods:

1. Lump Sum Basis:

If the bid schedule contains lump sum item for Painted Traffic Markings or Thermoplastic Pavement Markings, no measurement of quantities will be made.

2. Mile Basis:

- a. Miles of Single Stripe: A single stripe is a longitudinal marking less than six inches wide, such as, but not limited to, a single center line and edge stripes. Measurement shall be for the length of each individual stripe excluding gaps. Measurement shall be made in accordance with Section 108.

3. Square Foot Measurement:

Transverse pavement markings consisting of lines six or more inches wide shall be measured on a square foot basis.

4. Unit:

All other transverse markings shall be measured on a unit basis with each separate word or symbol constituting a unit.

5. Each:

Raised pavement markers shall be measured per each unit installed complete.

Removal of traffic stripes and pavement markings as well as repair of any damaged pavement or surfacing caused by the pavement marking removal operations shall be incidental to other items of work. Removal of pavement marking and traffic stripes as well as repair of the pavement is not a pay item on highway contracts.

670—4.03 PAYMENT

The accepted quantities as provided above will be paid for at the contract price per unit of measurement for those items listed below that appear on the bid schedule.

Payment shall be full compensation for cleaning of pavement, painting traffic markings, application of thermoplastic pavement markings, glass beads, installing raised pavement markings, furnishing paint, glass beads, thermoplastic materials and all other materials necessary to complete the work prescribed in this section.

Payment shall be made under:

<u>Pay Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
670(1)	Painted Traffic Markings	Lump Sum
670(2)	Single Stripe	Per Mile
670(3)	Double or Wide Stripe	Per Mile
670(4)	Transverse Pavement Marking Lines	Square Foot
670(5)	Transverse Markings, Words and Legends	Each
670(6)	Thermoplastic Pavement Markings	Lump Sum
670(7)	Raised Pavement Markers	Each

END OF SECTION

SECTIONS 671 - 699

RESERVED

DIVISION 700

MATERIALS

SECTION 701 HYDRAULIC CEMENT

701-2.01 PORTLAND CEMENT

Portland cement shall conform to the requirements of the following cited specifications for the type specified or permitted:

Type	Specifications
Portland Cement	AASHTO M 85
Masonry Cement	AASHTO M 150

Unless otherwise permitted, the product of only one mill of any one brand and type of portland cement shall be used on the project.

The contractor shall provide suitable means for storing and protecting the cement against dampness. Cement which, for any reason, has become partially set or which contains lumps of caked cement shall be rejected. Cement salvaged from discarded or used bags shall not be used.

END OF SECTION

SECTION 702 ASPHALT MATERIALS

702—2.01 ASPHALT CEMENTS

Asphalt cements shall conform to the requirements to AASHTO M 226, including the limits set forth in Table 1, thereof.

702—2.02 CUT—BACK ASPHALTS

Cut—back asphalts shall conform to The requirements of AASHTO M 81 and M 82, except where ASTM D 445 is specified, ASTM D 2170 is substituted; and for MC—30, revise the maximum distillate percentage by volume of total distillate at 225°C. to read: 35%.

In Table 1 of M82, reduce the minimum absolute viscosity on residue from distillation at 60°C to 100°C, in the MC—30 and MC—250 columns.

702—2.03 EMULSIFIED ASPHALTS

Emulsified asphalt shall comply with the requirements of AASHTO M 140.

Cationic emulsified asphalt shall comply with the requirements of AASHTO M 208.

702—2.04 APPLICATION TEMPERATURES

Asphalt materials for the several applications indicated in the specifications shall be applied within the temperature ranges indicated in Table 702—1.

TABLE 702-1
APPLICATION TEMPERATURE S

Type and Grade of Material	Spray °F.	Mix °F.
MC— 30	85+	
MC— 250	165+	165+
RC—800	200+	
CRS— 2	125-175	70-160*
CMS— 2	-----	70-160*
CSS— 1	-----	70-16*
AC-2.5	270+	235-280**
AC-5	280+	250-295**
AC-10	280+	250-315**

* Temperature of the emulsified asphalt in the pugmill mixture

** As required to achieve Kinematic viscosity of 150-300 centistrokes

END OF SECTION

SECTION 703 AGGREGATES

703—2.01 FINE AGGREGATE FOR CONCRETE

Fine aggregate for concrete shall conform to the requirements of AASHTO M 6 with the following exceptions:

Delete section on deleterious substances and substitute the following:

3.1 The amount of deleterious substances shall not exceed the following limits:

Friable particles percent by weight.....0.5 max.

Coal and Lignite, percent by weight using a liquid of 1.95 specific gravity. Only material that is brownish—black or black shall be considered as coal or lignite.....0.5 max.

Material passing the No. 200 sieve, percent by weight 3.0 max.

Delete paragraph 4.2 of AASHTO M 6.

Delete the following methods of sampling and testing:

Mount of material passing a No. 200 sieve.....AASHTO T 11
Sieve analysis.....AASHTO T 27
Soundness (freezing and thawing).....AASHTO T 103

And substitute the following:

Amount of material passing a No. 200 sieve.....Alaska T—7
7 Sieve Analysis.....Alaska T—7

703—2.02 COURSE AGGREGATE FOR CONCRETE

Course aggregate for concrete shall conform to the requirements of AASHTO M 80, with the following exceptions:

Delete section on deleterious substances and substitute the following:

6.3 The amount of deleterious substances shall not exceed the following limits:

Coal and Lignite, percent by weight (only material that is using brownish—black or black shall be considered as coal or lignite).....1.0 max.

Material passing the No. 200 sieve.....1.0 max.

Thin—elongated pieces, percent by weight. (Length greater than five Times average thickness).....15max.

Sticks and roots, percent by weight.....0.10 max.

Friable particles percent by weight.....0.25 max.

Maximum loss from AASHTO T 96 shall be 50 percent.
 Maximum loss from AASHTO T 104 shall be 12 percent.

Delete the following methods of sampling and testing:

Material passing the No. 200 sieve.....AASHTO T 11
 Sieve analysis.....AASHTO T 27

And substitute the following:

Material passing the No. 200 sieve.....Alaska T—7
 7 Sieve Analysis.....Alaska T—7
 Friable Particles.....ASTM C 142
 Sticks and Roots.....Visual Separation
 Percent by wet weight

Add the following:

AASHTO T 104 shall be performed using sodium sulfate solution.

703—2.03 AGGREGATE FOR BASE

Aggregates for base shall be crushed stone or crushed gravel conforming to the quality requirements of AASHTO M 147. Alaska T—1 and T—7 shall be substituted for AASHTO test methods T—11, T—27 and T—88. Aggregates shall have a minimum degradation value of 45 when tested in accordance with Alaska Test Method T—13.

A minimum of seventy percent (70%) by weight of particles retained on the No. 4 sieve shall have at least one fractured face. Percent fracture shall be determined by Alaska T—4.

Gradations shall conform to the following requirements:

TABLE 703—2
 AGGREGATES FOR UNTREATED BASE
 PERCENT PASSING BY WEIGHT

Sieve Designation	C—1	D—1
1 1/2 in.	100	-----
1 inch	70—100	100
3/4	60—90	70—100
3/8	45—75	50—80
No. 4	30—60	35—65
No. 8	22—52	20—50
No. 40	8—30	8—30
No. 200	0—6	0—6

703-2.04 AGGREGATE FOR PLANT MIX ASPHALT PAVEMENT

Coarse Aggregate:

Coarse aggregate (retained on the No. 4 Sieve) shall be crushed stone or crushed gravel and shall conform to the quality requirements of AASHTO M 79—64 except that sodium sulfate soundness loss shall not exceed 9 percent. Aggregates shall have a minimum degradation value of 45 when tested in accordance with Alaska Test Method T—13. When crushed gravel is used, in addition to the requirements above, it shall meet the pertinent requirements of AASHTO M62—64 and not less than 70 percent by weight of the particles retained on the No. 4 sieve shall have at least one fractured face. Percent fracture shall be determined by Alaska T—4.

Fine Aggregate:

Fine aggregate (passing the No. 4 sieve) shall consist of natural sand, stone screenings, or a combination thereof, and unless otherwise stipulated shall conform to the quality requirements of AASHTO M 29.

The several aggregate fractions for the mixture shall be sized, graded, and combined in such proportions that the resulting composite blend conforms to the following grading requirements. Aggregate gradations shall be determined by Alaska T—7, except when the sample is obtained under 401—2.01(A3), the size of the sample will be as listed in AASHTO T 164.

TABLE 703—3
ASPHALT CONCRETE AGGREGATE
 Percent Passing by Weight

Sieve Designation	Asphalt Concrete			Open Graded Asphalt Concrete	
	Type I	Type II	Type III	Type I	Type II
1 inch	100	-----	-----	100	-----
3/4 inch	85—100	100	-----	95—100	-----
1/2 inch	-----	-----	100	-----	-----
3/8 inch	65—85	68—88	75—93	-----	100
No. 4	45—65	45—65	55—80	-----	30—50
No. 10	30—50	30—50	40—66	0—7	5—15
No. 40	12—30	12—28	14—30	-----	-----
No. 200	3—10	3—10	3—10	0—3	2—5

At least fifteen (15) days in advance of beginning work, the Contractor shall submit a representative twenty—five (25) pound sample of the aggregate and a one (1) quart sample of the asphalt material proposed for use in the work. The materials shall be tested in accordance with Alaska Test Method T—14, as submitted (without addition of anti-stripping additives). The retention of the asphalt shall be above seventy percent (70%). Materials failing to conform to this requirement shall not be used unless the Contractor provides approved anti-stripping additives which corrects this deficiency.

703—2.05 AGGREGATE FOR COVER COAT MATERIAL

Aggregates shall be crushed stone, or crushed gravel. Only one type of aggregate shall be used on the project unless alternate types are approved. Aggregates shall meet the quality requirements of AASHTO M 78—64, except that the sodium sulfate soundness loss shall not exceed nine percent (9%) or the magnesium sulfate soundness loss shall not exceed twelve percent (12%). The aggregate shall have a degradation value of not less than fifty (50) when tested in accordance with Alaska Test Method T—13 and not less than ninety percent (90%) by weight shall be particles having at least one fractured face as determined by Alaska Test Method T—14.

At least fifteen (15) days in advance of beginning work, the Contractor shall submit a representative twenty—five (25) pound sample of the aggregate and a one (1) quart sample of the bituminous material proposed for use in the work. The materials will be tested in accordance with Alaska Test Method T—14 as submitted; i.e., without addition of anti—stripping additives; and when so tested the retention of the asphalt shall be above seventy percent (70%). Materials failing to conform to this requirement will not be permitted to be used on the work unless the Contractor provides approved anti—stripping additives or employs other approved measures which correct this deficiency.

The aggregate shall have no adherent films or coatings of dirt, clay, dust or other deleterious matter that could impede adherence of the bituminous material. Washing of the aggregate may be necessary.

Gradation shall be determined by Alaska T—7.

TABLE 703—4
REQUIREMENTS FOR GRADING OF
AGGREGATE FOR SEAL COATS

Sieve Designation	Percent Passing by Weight			
	Type II Cover Aggregate	Type III Cover Aggregate Grading A	Grading B	Grading C
1/2 Inch	-----	-----	-----	100
3/8 Inch	100	100	100	90-100
No. 4	85-100	85-100	60-100	10-30
No. 8	-----	0-25	0-10	0-8
No. 50	0-20	-----	-----	-----
No. 200	0-2	0-2	0-2	0-2

TABLE 703—5
REQUIREMENTS FOR GRADING OF AGGREGATE
FOR ASPHALT SURFACE TREATMENT

Sieve Designation	Percent by Weight Passing Square Mesh Sieves (ALASKA T-7)						
	Grading A	Grading B	Grading C	Grading D	Grading E	Grading F	Grading G
1 1/2 Inch	100	-----	-----	-----	-----	-----	-----
1 Inch	90-100	100	-----	-----	-----	-----	-----
3/4 Inch	-----	90-100	100	-----	-----	-----	-----
1/2 Inch	0-15	20-55	90-100	100	100	-----	-----
3/8 Inch	-----	0-15	40-75	90-100	90-100	100	100
No. 4	-----	0-5	0-15	0-20	10-30	75-100	85-100
No. 8	-----	-----	0-5	0-5	0-8	0-10	60-100
No. 200	0-2	0-2	0-2	0-2	0-2	0-2	0-10

703—2.06 MINERAL FILLER

Mineral filler shall conform to the requirements of AASHTO M 17.

703—2.07 NOT USED

703—2.08 FILTER BLANKET

Filter blanket material shall contain no muck, frozen material, roots, sod or other deleterious matter. It shall have a plasticity index not greater than six (6) as determined by AASHTO T 89 and T 90.

Filter blanket material shall be graded as determined by Alaska T—7 as follows:

Sieve Designation	Percent by Weight Passing
4 Inch	100
No. 40	22-100
No. 200	0-10

703—2.09 SUBBASE

Subbase shall contain no muck, frozen material, roots, sod or other deleterious matter. It shall have a liquid limit not greater than twenty—five (25) and plasticity index not greater than six (6) as determined by AASHTO T 89 and T 90. Subbase grading type shall be as specified in the bid schedule and as determined by Alaska T—7.

703—6
 REQUIREMENTS FOR GRADING FOR SUBBASE

Sieve Designation	Grading A	Grading B	Grading C	Grading D	Grading E
4 Inch	100	-----	-----	-----	-----
2 Inch	85-100	100	-----	-----	-----
1 Inch	-----	-----	100	-----	-----
3/4 Inch	-----	-----	-----	100	-----
No. 4	30-70	30-70	45-75	45-80	-----
No. 10	-----	-----	25-55	30-65	-----
No. 200	10 Max.	3-10	4-10	4-12	0-6*

* Gradation shall be determined on that portion passing the three inch (3") screen.

Subbase shall meet the quality requirements of AASHTO M 147 except that Alaska T—1 and T—7 will be substituted for AASHTO T 11, T 27 and T 88.

Subbase Grading C and Grading D shall consist of crushed material, of which at least fifty percent (50%) by weight of the particles retained on the No. 4 sieve shall have at least one fractured face as determined by Alaska T—4. Aggregates shall have a minimum degradation value of 40 when tested in accordance with Alaska Test Method T—13, except that the minimum degradation value shall forty—five (45) when used as a wearing course.

The fracture requirement herein specified will not be required for Grading A, Grading B or Grading E; however, if Grading A and/or Grading B is produced from gravel, all suitable oversize material less than ten inches in average diameter shall be crushed.

703-2.10 POROUS BACKFILL MATERIAL

Porous material for bedding and backfilling pipe under drains shall be gravel or sand consisting of crushed or naturally occurring granular material containing not more than one percent (1%) clay lumps or other readily decomposed material.

It shall be washed if necessary to render the particles free from clay. It shall conform to the following requirements for grading, as determined by Alaska T—7.

Sieve Designation	Percent by Weight Passing
3 Inch	100
3/4 Inch	70-100
No. 4	40-100
No. 16	20-80
No. 100	0-10
No. 200	0-5

Foundry sand or other material which may be cementitious or not suitable for water percolation shall not be used.

703—2.11 GABION BACKFILL

Stone or gravel for filling the gabion baskets may come from excavation or other sources selected by the Contractor and approved by the Engineer. Stone and gravel shall be uniformly graded from four inches (4") to twelve inches (12") in least dimension and shall have a percentage of wear of not more than sixty (60), as determined by ASTM C 535.

703—2.12 BORROW

All borrow materials shall be approved by the Engineer for the intended construction use, prior to incorporation into the project.

Borrow Type A, shall be earth, sand, gravel, rock or combination thereof, and shall contain no muck, peat, frozen material, roots, sod or other deleterious matter, have a plasticity index of not greater than six (6) as determined by AASHTO T 90, have not more than twelve percent (12%) minus two hundred material as determined by Alaska Test Method T—7. The minus two hundred material shall be determined on minus three inch material.

Borrow Type B, shall be earth, sand, gravel, rock or combinations thereof, and shall contain no muck, peat, frozen material, roots, sod or other deleterious matter, and shall be compactable in accordance with the provision of Section 203.

703—2.13 SELECT GRAVEL

Select gravel shall contain no muck, frozen material, roots, sod or other deleterious matter. It shall be non—plastic as determined by AASHTO T—90. Select gravel shall be alluvial material. Select gravel grading type shall be as determined by Alaska T—7.

TABLE 703—7
GRADING REQUIREMENTS FOR SELECT GRAVEL

Sieve Designation	Percent by Weight Passing
4 Inch	100
2 Inch	85-100
No. 4	30-70
No. 60	35 Max.
No. 200	6 Max.

END OF SECTION

SECTION 705 JOINT MATERIAL

705—2.01 JOINT FILLERS

Pre—formed expansion joint fillers shall conform to the requirements of AASHTO M—213.

705—2.02 JOINT SEALER

The liquid polymer type joint sealer shall conform to the following requirements. The polymer compounds designated herein shall be of a consistency that will permit their use at all temperatures above 50°F. and shall be capable of completely filling the joint without formation of air holes or discontinuities.

Curing of the polymer compounds is to be by chemical reaction of the two components and not by evaporation of solvent or fluxing of harder particles. The sealant shall cure track and tack—free to traffic within six hours at 70°F.

The materials forming the sealing compound shall comply with the following requirements:

Penetration, 77°F., 150 gms., cone, 5 sec.	0.3—13 cms
Hardiness Shore A	10 mm.
Bond Extension Test, 20°F., 3 cycles Dry Concrete Block	Pass*
* None of the specimens shall develop any crack separation, or other opening in the sealing compound or between the sealing compound and concrete block.	
Flow at 200°F.	0—0.5 cms
Resilience Test -- Recovery Air Cured	70 plus percent
Oven Cured	70 plus percent

The joint materials, herein described, shall be furnished in substantial containers clearly marked by the manufacturer with the name of material, name of manufacturer, brand name, weight, batch number, and recommended proportioning and handling procedures. Tests shall be performed in accordance with AASHTO T 187, except as herein modified. If so specified, or if permissible by the manufacturer's recommendation, test specimens may be prepared by hand mixing in the designated proportions. If so specified by the manufacturer, the laboratory specimens shall be mixed by a laboratory size proportioning and mixing unit furnished by the manufacturer. The mixing and proportions shall be as recommended by the manufacturer.

All test specimens shall be conditioned or cured in air for 24 hours plus or minus 1 hour, at a temperature of 750 plus/minus 7°F.

- 1a. Penetration. A 6 oz. seamless can shall be overfilled with the compound, the excess overflow struck off with a spatula or similar tool, and set aside to cure. Care shall be taken to avoid entrapment of air.
- 1b. Five penetration readings shall be taken at a distance of not less than 1/2 from the edge of the can. The results of the penetration shall be recorded as the average of the five readings.
2. Bond. The test shall be run at —20°F. plus/minus 5°F. for three cycles.

- 3a. Resilience. A specimen shall be prepared as described above for the penetration test. Following the 24 hour air cure at 75°F., it shall be maintained in air at a temperature of 77°F. plus/minus 2°F. for one hour. It shall then be placed in position in a penetrometer, in accordance with ASTM D5—73, except that a steel ball having a diameter of .675 inch plus/minus .005 inch attached to a shaft of .2175 inch diameter and 1.9375 inch long with a suitable extension for inserting in the penetrometer, shall be substituted for the needle. The total weight of the moving plunger shall be 75 grams.
- 3b. The ball shall be placed in contact with the surface of the specimen in air at 77°F. plus/minus 2°F. and the indicating dial shall be set at zero. The ball shall be loaded manually to cause it to penetrate the specimen to a dial reading of 1.00 cm at approximately a uniform rate of 0.1 cm/second. The ball shall be locked in this position and held for five seconds, during which time the indicating dial shall be reset to zero. The locking mechanism shall then be released. At the end of 20 seconds, the indicating dial shall be read. Resilience of the original sample, expressed as a percentage, shall be reported as 1.00 cm. minus the dial reading.
- 3c. The specimen shall be placed in an air-circulated oven at 158°F for 24 hours. It shall then be removed and held at room temperature for one hour. It shall be maintained in air at a temperature of 77°F plus/minus 2°F. for one hour and then tested for resilience as above described. The result shall be reported as resilience of the oven—aged sample.
4. Flow at 200°F. The specimen shall be trimmed immediately after filling. The test shall be made at 200°F+2°.

705—2.03 BRIDGE SEAL

Elastic Compression Seals. The elastic compression seals for use in deck joints shall be performed elastic polychloroprene conforming to the following requirements of ASTM D 2000:

4AA 520 A₁₃B₁₃C₁₂F₁₉K₂₁

Extruded Strip Seals. Extruded strip seals for the bridge expansion joints shall be of material conforming to the following requirements of ASTM 1)2000:

4AA 520 A₁₃B₁₃C₁₂F₁₉

705—2.04 JOINT MORTAR

Pipe Joint mortar shall consist of one part portland cement and two parts approved sand with water as necessary to obtain the required consistency. Mortar shall be used within 30 minutes after its preparation.

705—2.05 RUBBER GASKETS

The ring gaskets shall conform to the requirements of AASHTO M 198.

705—2.06 PERFORMED PLASTIC SEALING COMPOUND

Performed plastic sealing compounds for concrete pipe joints shall meet the requirements of Federal Specifications SS—S—210.

END OF SECTION

SECTION 707 METAL PIPE

707—2.01 CORRUGATED STEEL PIPE, PIPE ARCHES, AND UNDERDRAINS

Conduits and coupling bands including special sections such as elbows and flared end sections for use in conjunction with these conduits shall conform to the requirements of AASHTO M 36 and AASHTO M 218 for the specified sectional dimensions and gages.

Shop—formed elliptical pipe shall be furnished where specified.

707—2.02 BITUMINOUS COATED CORRUGATED STEEL PIPE, PIPE ARCHES, & UNDERDRAINS

These conduits and the coupling bands shall conform to the requirements of AASHTO M 190 for the specified sectional dimensions, gages, and type of bituminous coating. Coupling bands shall be fully coated with bituminous material. Shop—formed elliptical pipe shall be furnished where specified.

Special sections, such as elbows and flared end sections, for these conduits shall be of the same gage as the conduit to which they are joined and shall conform to the applicable requirements of AASHTO M 190. Coating and invert paving shall be of the type specified.

When asbestos bonded bituminous coating is specified these requirements shall equally apply and in addition the special process of embedding asbestos fiber in the molten bonding medium shall be used to bond the bituminous coating.

The specified minimum diameter of perforations shall apply after coating.

707—2.03 CORRUGATED ALUMINUM ALLOY CULVERT PIPE AND UNDERDRAINS

This pipe shall conform to the requirements of AASHTO M 196.

Helical Corrugated Aluminum Alloy Culvert Pipe shall conform to AASHTO M 196.

707—2.04 STRUCTURAL PLATE CULVERTS

Structural plate culverts shall conform the AASHTO M 167 for steel or iron plates, and AASHTO M 219 for aluminum alloy.

707—2.05 RESERVED

707—2.06 SERVICE PIPE

Copper pipe shall be cold drawn, seamless, annealed Type “K” with flare fittings which complies with ASTM B 88.

Steel Pipe unless otherwise definitely specified, shall be standard weight, Class 2, galvanized, welded or seamless pipe which complies with ASTM A 120.

1. Fittings shall be of malleable iron, 150 pounds per square inch working pressure, zinc coated (galvanized) which complies with Federal Specification WW—P—521F.

2. Unions shall be treaded malleable iron, 250 pounds per square inch working pressure, zinc coated (galvanized) with ground joint and brass seat, which complies with Federal Specification WW—U—531E.

707—2.07 DUCTILE IRON PIPE

Ductile Iron Pipe shall conform to AWWA C—151. Water pipe shall be cement mortar lined and be of thickness Class 52. Sewer and storm drain pipe shall be of thickness Class 50 and be lined with Polyethylene or coal tar epoxy. Plastic lining shall be U.S. Pipe “Polylined”, or equal. Coal tar epoxy lining shall be 15 to 25 mils of factory applied “Koppers Bitumastic 300M, or equal.

END OF SECTION

708—2.01 PAINT FOR STEEL STRUCTURES

1. General Requirements. Paint furnished shall be shipped in strong, substantial containers, plainly marked with the name, weight, and volume of the paint content, together with the color formula, batch number, and the name and address of the manufacturer.
2. The paint shall conform to the requirements outlined below:
 - a. Shop Coat. The Shop Coat (Prime Coat) shall be Red—Lead Base Ready Mixed Alkyd Varnish Linseed Oil Paint conforming to the requirements of AASHTO M 72, Type III.
 - b. Intermediate Coat. The intermediate coat shall be the same as the prime coat, but shall be tinted with lampblack to a different shade than the prime coat. The quantity of lampblack added shall not exceed 1/4 pound per gallon of linseed oil. Lampblack shall conform to ASTM D 209.
 - c. Finish Coat. The finish coat shall be a Tinted Alkyd Paint conforming to the requirements of SSPC Specification No. 104, Type II. The color in the dry state shall closely match Color 36440 of Federal Standard Specification No. 5950.

708—2.02 PAINT FOR TIMBER

Paint for timber and miscellaneous structures shall conform to the following requirements.

1. General Requirements. Paint furnished shall be shipping in strong, substantial containers, plainly marked with the name, weight, and volume of the paint content, together with the color formula, batch number, and the name and address of the manufacturer.
2. The paint shall conform to the requirements outlined below:
 - a. White paint shall conform to all the requirements of AASHTO M 70, Type I, Class A.
 - b. Black paint shall conform to all the requirements of AASHTO M 68.
 - c. Medium chrome—yellow paint shall conform to the requirements of AASHTO D 211 Type III.
 - d. Red lead ready mixed paint shall conform to the requirements of AASHTO M 72 Type II.

708—2.03 PAINT FOR TRAFFIC MARKINGS

General Requirements:

1. The Contractor shall furnish the name of the company that will manufacture the paint and the location of the plant from where shipments will be made.
2. Traffic Line Paint shall conform to AASHTO M248, Type III F.

END OF SECTION

SECTION 709 REINFORCING STEEL AND WIRE ROPE

709—2.01 REINFORCING STEEL

Reinforcing steel shall conform to the requirements of the following specifications.

Billet—Steel Bars for Concrete Reinforcement	ASTM A 615
Fabricated Steel Bar or Rod Mats for Concrete Reinforcement	ASTMA 184
Welded Steel wire Fabric for Concrete Reinforcement	ASTM A 185
Cold—Drawn Steel Wire for Concrete Reinforcement	ASTM A 82

Spiral reinforcement conforming to the requirements of ASTM A 82 may be used for bridges, when the material has a minimum yield strength of 60,000 psi.

709—2.02 WIRE ROPE OR WIRE CABLE

The wire rope or wire cable shall conform to the requirements of AASHTO M30 for the specified diameter and strength class.

709—2.03 EPOXY-COATED REINFORCING STEEL

When specified in the contract, organic protective coatings shall be electrostatically applied to steel bars conforming to the requirements of Section 709—2.01.

1. Coating Materials.

The coating powder shall be one of the following prequalified products:

- a. Scotchkote 202 or Scotchkote 213 by the Minnesota Mining and Manufacturing Company.
- b. Fliutfiex 531—6080 by the E. I. Dupont de Nemours Company, Inc.
- c. Epoxy Powder 720—A—009 by the Cook Paint and Varnish Company.
- d. Corvel ECA—1558-Red 27000 by the Polymer Corporation.
- e. Epoxiplate—346, 347 and 348 by the Armstrong Products Company.
- f. NAP—GARD 7—2000 by the Napco Corporation.

The manufacturer shall certify that the coating material is of the same composition and quality as that approved under the prequalification program.

Material for patching coatings shall be compatible with the coating material and inert in concrete.

2. Coating Applicators.

Coatings shall be applied only by applicators prequalified in applying the particular coating manufacturer's product. The Owner reserves the right to test samples of the applicator's product for conformance with the qualification requirements. Samples for such testing shall be made available when requested at no additional cost to the Owner.

3. Application.

Coatings shall be applied in accordance with the recommendations of the coating manufacturer. Surfaces of bars to be coated shall be cleaned in accordance with the coating manufacturer's recommended surface preparation procedures prior to application of the coatings. Cleaned bars exhibiting visual oxidation or those remaining uncoated more than eight hours shall be recleaned prior to coating.

a. Coatings shall be applied at a thickness of 7 ± 2 mil. Straight bar production coating shall be monitored by an in line holiday detector with automatic marking capacity. Thickness of the film shall be measured in accordance with the requirements of ASTM G 12.

b. The coating shall be checked visually after cure for continuity. It shall be free from holes, voids, contamination, cracks, and damaged areas.

The coating shall not have more than two holidays (pinholes not visible to the naked eye) in any linear foot of the coated bars. Holiday checks shall be made with a 67—1.2 volt holiday detector in accordance with the manufacturer's instructions.

c. The flexibility of the coating shall be evaluated by bending production coated bars 120 degrees (after rebound) around a mandrel having a diameter equivalent to the bar size in inches. The bend shall be made at a uniform rate and may take up to one minute to complete. The two longitudinal deformations may be placed in a plane perpendicular to the mandrel radius and the test specimen shall be at thermal equilibrium between 20 and 30 degrees C.

No cracking of the coating shall be visible to the naked eye on the outside radius of the bend bar.

d. The coating applicator shall check each production lot, using the method he has found most effective for measuring cure, and shall certify that the entire production lot of coated bars supplied is in the fully—cured condition.

4. Repair of Damaged Coatings.

Patching will be required on straight areas of the rebar only if damage exceeds 2 percent of the coated area within the total straight portion of the coated rebar. When coating repair is required, all damage shall be patched in straight areas of the rebar.

Patching will be required within each bent area of the rebar only if bond loss and damage exceed 5 percent of the coated area within each bent area. When coating repair is required, all damage within each area shall be cleaned and patched, but each bent area may be treated individually. Hairline cracks without bond loss or other damage on fabrication bends need not be patched.

Required patching shall be done as soon as possible and before visible oxidation appears. It shall be done at the Fabricator's plant using the powder manufacturer's specified material.

END OF SECTION

SECTION 710 FENCE AND GUARD RAIL

710—2.01 BARBED WIRE

Barbed wire shall conform to the requirements of ASTM A 121, Class 1 coating.

710—2.02 WOVEN WIRE

Woven wire shall conform to the requirements of ASTM A 116, Class 2 coating.

710—2.03 CHAIN LINK FABRIC

Chain link fabric, required fittings, and hardware shall conform to the requirements of AASHTO M 181.

Fabric shall be galvanized after weaving.

Minimum fabric wire size shall be 9—gage (0.148 inches, minimum diameter).

Intermixing of fabric types will not be allowed.

710—2.04 METAL BEAN RAIL

Rail elements and end or buffer sections shall be steel conforming to the requirements of AASHTO M 180, Class A, Type 2.

Bolts and nuts shall conform to the requirement specified in A.ASHTO N 180.

710—2.05 STEEL FENCE POSTS

Steel fence posts shall conform to the following:

Type 1, standard weight schedule 40 pipe, galvanized in accordance with AASHTO M III.

Type II, pipe manufactured from steel conforming to ASTM-A-569, cold rolled, triple-coated with 1.0 ± 0.01 ounce zinc per square foot, cromate and 0.3 mils minimum clear polyurethane acrylic coating.

When Type II pipe posts are furnished, gates shall be fabricated from material conforming to Section 710—2.05, Type II.

710—2.06 GUARD RAIL POSTS

Railing posts shall be either wood or steel as specified. When the choice of post is at the option of the Contractor, there shall be only one kind furnished on the project.

SECTION 710

710-2.07 GUARD RAIL HARDWARE

Unless otherwise specified all fittings, bolts, washers and other accessories shall be galvanized in accordance with the requirements of AASHTO M 111 or ASTM A 153, whichever may apply. All galvanizing shall be done after fabrication.

710—2.08 WIRE MESH

Wire mesh (poultry netting) shall be galvanized 2 inch mesh, 20 gage wire, of the height shown on the plans.

710—2.09 ANCHOR WIRE

Anchor wire shall be galvanized 9 gage steel.

710—2.10 PIPE COUPLINGS

Pipe couplings shall be galvanized non-recessed, taper tapped, extra heavy couplings.

END OF SECTION

SECTION 711 CONCRETE CURING MATERIALS AND ADMIXTURES

711—2.01 CURING MATERIALS

Curing material shall conform to the following requirements as specified:

Burlap Cloth made from Jute or Kenaf	AASHTO M 182
Sheet Material for Curing Concrete	AASHTO M 171
Liquid Membrane—Forming Compounds for Curing Concrete, Type 1	AASHTO M 148

The requirements specified in AASHTO M 148 covering “Liquid Membrane—Forming Compounds for Curing Concrete” are modified as follows:

1. Scope. Add the following: Liquid membrane—forming compounds utilizing linseed oil shall not be used.
2. AASHTO Standards: Delete the reference to AASHTO Test T 155 and substitute Alaska Test Method T-20.

711—2.02 AIR—ENTRAINING ADMIXTURES

Air—entraining admixtures shall conform to the requirements of AASHTO M 154.

END OF SECTION

SECTION 712 MISCELLANEOUS

712—2.01 WATER

Water used in mixing or curing concrete shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substance injurious to the finished project. Water will be tested in accordance with, and shall conform to the suggested requirements of AASHTO T 26. Water known to be of potable quality may be used without testing. Where the source of water is relatively shallow, the intake shall be so enclosed as to exclude silt, mud, grass, or other foreign materials.

712—2.02 CALCIUM CHLORIDE

Calcium chloride shall conform to the requirements of AASHTO M 144.

712—2.03 RESERVED

712—2.04 PRE—CAST CONCRETE CURBING

Pre—cast concrete curbing shall consist of pre—cast portland cement concrete curb units constructed to the lengths, shapes, and other details shown on the plans. These units shall be reinforced with steel reinforcement when shown on the plans. Steel reinforcement shall conform to Section 709—2.01. When required for driveways, crossing, closure, or for other reasons, a depressed or modified section of contracts is indicated on the plans, the Contractor shall furnish curbing with the required modifications.

712—2.05 PRE—CAST CONCRETE UNITS

Pre—cast concrete units such as manholes, catch basins and inlets shall conform to the requirements of AASHTO M 199, except that the absorption test will not be required.

Cracks in units, honey combed or patched areas in excess of 30 square inches will be cause for rejection.

712—2.06 FRAMES, GRATES, COVERS, AND LADDER RUNGS

Metal units shall conform to the plan dimensions and to the following specification requirements for the designated materials.

Gray iron castings shall conform to the requirements of AASHTO M 105, Class 35 B.

Carbon—steel castings shall conform to the requirements of AASHTO M 103. Grade shall be optional unless otherwise designated.

Structural steel shall conform to the requirements of AASHTO M 183.

Galvanizing, where specified for these units, shall conform to the requirements of AASHTO M 111.

Malleable iron castings shall conform to the requirements of ASTM A 47. Grade shall be optional unless otherwise designated.

712—2.07 CORRUGATED METAL UNITS

The units shall conform to plan dimensions and the metal to AASHTO M 36. Bituminous coating, when specified, shall conform to AASHTO M 190, Type A.

712—2.08 GLASS SPHERES FOR REFLECTORIZING HIGHWAY PAVEMENT MARKINGS

Reflective Glass Beads shall conform to AASHTO M 247 Type I, and shall be supplied with a moisture resistant coating.

712—2.09 CORPORATION STOPS AND CURB STOPS

See Section 628—2.00

712—2.10 WATER GATE VALVES

See Section 628—2.00

712—2.11 VALVE SERVICE BOXES

See Section 628—2.00

712—2.12 HYDRANTS

See Section 628—2.00

712—2.13 GABIONS (WIRE)

Material. Wire, for use in the gabion mesh shall be 11 gage minimum, except that the salvage may be heavier. Wire used in the mesh shall equal or exceed ASTM A 641 medium hardness and tensile strength; Class 3 coating. Samples for testing shall include at least one sample of each component of the mesh.

Tie and connecting wire shall be supplied in sufficient quantity for securing and fastening all edges of the gabion baskets and diaphragms, for fastening adjacent gabion baskets together, and to provide cross connecting wires in each gabion cell as hereinafter specified. Tie wire shall conform to the same specifications as wire used in the mesh except that it may be not more than 2 gages smaller.

Mesh Openings. Openings of the mesh shall be approximately four inches in the longest dimension.

Non-raveling Construction.

The wire mesh shall be fabricated in such a manner as to be non—raveling. This is defined as the ability to resist pulling apart at any of the connections forming the mesh when a single wire strand in a section of mesh is cut.

Dimensions. Gabion baskets shall be supplied, as specified, in various lengths and heights. The lengths shall be multiples (2, 3, or more) of the horizontal width. The horizontal width shall be not less than 24 inches or more than 48 inches. However, all gabion baskets furnished by a manufacturer shall be of uniform width.

Fabrication. Gabion shall be fabricated in such a manner that the sides, ends, lid, and diaphragms can be assembled at the construction site into a rectangular basket of the required sizes. Gabions are to be of single unit construction -- the base, ends, and sides either to be woven into a single unit or one edge of these members connected to the base section of the gabion in such a manner that strength and flexibility at the point of connection is at least equal to that of the mesh.

Where the length of the gabion exceeds its horizontal width, the gabion is to be equally divided by diaphragms, of the same mesh and gage as the gabion basket and making compartments of a length approximately equal to horizontal width. The gabion shall be furnished with the necessary diaphragms secured in proper position on the base section in such a manner that no additional tying at this juncture will be necessary.

All perimeter edges are to be securely salvaged or bound so that the joints formed by tying the selvages have approximately the same strength as the body of the mesh.

712—2.14 THERMOPLASTIC PAVEMENT MARKINGS

1. General Requirements:

- A. The reflectorized plastic pavement markers and legends shall consist of homogeneous, extruded, pre—fabricated thermoplastic ribbon of specified width, which shall contain glass spheres uniformly distributed throughout the entire cross section, and shall be capable of being placed on hot asphalt or of being affixed to existing bituminous pavements by means of a precoated adhesive and pressure or liquid contact cement as herein specified.
- B. Pavement legends and symbols must conform to the applicable shapes and sizes outlined in the manual on Uniform Traffic Control Devices with Alaska supplement and the contract plans.
- C. The plastic marker shall mold itself to pavement contours, breaks, faults, etc. at normal pavement temperatures. The plastic markers shall have resealing characteristics such that it will fuse with itself and with previously applied markings of the same composition under normal conditions of use.
- D. The marking shall be one of the two types:
 - Type A — 60 mil retro—reflective pliant polymer.
 - Type B — 90 mil reflectorized plastic marker.

2. Type A Thermoplastic markings shall conform to the following:

- A. Composition requirements: The reflectorized plastic marker material shall consist of a mixture of polymeric materials, pigments, 1.5 index glass beads uniformly distributed throughout its cross—sectional area, and with a reflective layer of beads bonded to the top surface. These materials shall be composed as follows:

<u>Material</u>	<u>(Comparison of Weight Minimum)</u>
Resins & Plasticers	20%
Pigments	30%
Graded Glass Beads	25%

B. Physical requirements:

- (1) Tensile Strength: The film shall have a minimum tensile strength of 40 pounds per square inch of cross section when tested according to ASTM D638—76.
- (2) Plastic Pull Test: A test specimen which shall be made by cutting two 1—inch by 3—inch pieces of the plastic and attaching a 1—inch by 1—inch area at the end of each piece to the other, shall support a dead weight of four pounds for not less than five minutes at a temperature between 70°F. and 80°F.
- (3) Pigmentation: The pigments shall be selected and blended to provide a marking film which shall include titanium dioxide for white markers and medium chrome yellow for markers conforming to standard highway colors through the expected life of the film.
- (4) Glass Beads: The glass beads shall be colorless and have a minimum index of a refraction of 1.50 when tested using the liquid oil immersion method. The size and quality of the beads shall be such that performance requirements for the plastic shall be met.
- (5) Skid Resistance: The surface of the plastic shall provide a minimum skid resistance value of 35 BPN when tested according to ASTM E303—74.
- (6) Reflective Intensity: The white and yellow film shall have the following initial reflective values at 0.2° and 0.5° observation angles measured in accordance with the photometric testing procedures of Federal Specifications FP—79, Section 718.01(a).

Reflective values shall be expressed as candlepower per five square feet (candles per lux per five square meters) measured on a square panel, 5 square feet in area, at an 86° angle. The five square feet is derived from a standard stripe, defined as 4 inches x 15 feet = 5 square feet.

	<u>White</u>	<u>Yellow</u>
Observation Angle	0.2° 0.5°	0.2° 0.5°
Entrance Angle, 86°	0.20 0.15	0.15 0.10

- (7) The following tests shall be employed to measure reflectivity retention:
 - (a) Taber Abraser Simulation Test: Using a taber abramer with an H—18 wheel and a 125 gram load, the sample shall be inspected at 50, 100 and 200 cycles, under a microscope, to observe the extent and type of bead failure.

No more than 10% of the beads shall be lost due to pop—out and the predominant mode of failure shall be “wear down” of the beads.
 - (b) Qualitative Tests: Bead bond strengths shall be judged under a microscope with a magnification of 5X. The beads when removed

shall show a portion of the polymer bead bond retained with the beads.

- (8) In lieu of running above tests, a certification from the manufacturer stating the product conforms to the above tests will be acceptable.
- (9) Effective Performance Life: The plastic shall provide a neat, durable marking that will not flow or distort due to temperature if the pavement surface remains stable.

The plastic shall be weather resistant and through normal traffic wear, shall show no appreciable fading, lifting or shrinkage and shall show no significant tearing, roll back, or other signs of poor adhesion.

- C. Application: Vendor shall furnish a mechanical applicator for the installation of a 4 inch wide pressure sensitive adhesive coated material. Mechanical applicator to be provided on location for the duration of the installation period. A manufacturer's representative shall be present during the time of the installation to provide technical assistance as to operation and maintenance of the mechanical applicator.

3. Type B Thermoplastic markings shall conform to the following:

- A. Composition Requirements: The reflectorized plastic marker material, hereafter referred to as plastic, shall consist of:

	(Comparison by Weight)	
	<u>Max.</u>	<u>Mm.</u>
Plastics & Plasticizers	46%	40%
Pigments	42%	38%
Graded Glass Spheres	30%	25%

Pigments shall include titanium dioxide for white markers, and C.P. medium chrome yellow for yellow markers. This titanium dioxide should be a least 20% of the total pigment in white markers. The yellow markers should have a minimum of 18% pigment as chrome yellow. The graded glass spheres shall be colorless, clean and transparent, free from milkiness. The spheres when tested by the liquid immersion method at 25°C, shall show an index of refraction within the range of 1.50 to 1.60. A minimum of 85% of the glass spheres shall be retained on a 140 mesh U.S. Standard Screen, when tested in accordance with ASTM D—1214—58, “Method of Test for Sieve Analysis of Glass Spheres”.

As supplied, the plastic without precoated adhesive shall not be less than 0.09 inch in thickness. The edges shall be clear cut and true.

Plastic shall be supplied complete with a precoated adhesive and an easily removable backing shall protect the adhesive in storage and facilitate rapid application.

The plastic and its adhesive shall be sufficiently free of tack so that it can be easily handle without the protective backing, and be repositioned on the surface to which it is to be applied, before permanently fixing it in this position with a downward pressure.

B. Physical Requirements:

- (1) Bend Test: The plastic shall be of such a structure that at a temperature of 80°F., a piece of 3 inch •by 6 inch (with backing) placed upon a 1 inch diameter mandrel, may be bent over the mandrel until the end faces are parallel and 1 inch apart. There shall be no fracture lines apparent in the uppermost surface by visual inspection.
- (2) Reseal Test: The plastic shall reseal itself when tested as specified. Cut two 1 inch by 3 inch pieces of plastic. Overlap these pieces face to face for an area of 1 square inch on a flat steel plate, with the backing material remaining in place. Center a 1,000 gram weight over the 1 square inch overlap area, and placed in an oven at 190°±10°F. for two (2) hours. After cooling to room temperature, the pieces shall not be separable without tearing.
- (3) Adhesive Backing Release Material Removal: The release material shall be completely removed when tested as specified. Cut a 1/2 inch x 6 inch specimen. Remove the release material for 1 inch of the length and attach the non—adhesive side to a vertical surface with a suitable clamp at the point where the release material was removed. Attach a clamp which has a support 1 lb. weight attached to it, to the end of the partly removed release material. Release the weight. Examine the specimen for any remaining release material.
- (4) Strength: The plastic shall require between 10—25 lbs. to break. The elongation shall be no greater than 50%. The specimens for this test shall be Type I prepared in accordance to the methods described in ASTM D 638. One inch squares of carbonundum extra course emery cloth or its equivalent may be applied at each end of the test specimen to prevent the plastic adhesion from adhering to the test equipment. The break resistance shall be made on an average of at least three (3) samples, and the rate of pull of the test shall be 0.25 of an inch per minute. This test shall be conducted at a temperature of 70 — 80°F.
- (5) Plastic Pull Test:

A test specimen cut to dimension of 1 inch x 6 inches shall support a dead load weight of 6 lbs. for not less than thirty (30) minutes. This test shall be conducted at a temperature of 70° — 80°F.
- (6) Glass Sphere Retention: The plastic shall have glass sphere retention qualities. A 2 inch x 6 inch specimen of plastic shall be cut at a right angle to the beveled edge and bent parallel to the beveled edge of 1/2 inch mandrel. While the specimen is bent, a strip of 1/2 inch wide masking tape (such as Utilitape, manufactured by Permacel) shall be applied firmly along the length of the arc of maximum bend and then removed. Should any glass spheres remain on the masking tape when the strip is removed, the material shall be rejected.
- (7) Skid Resistance: The surface friction of properties of the plastic shall not be less than 35 BPN, when tested according to ASTM E303.

- (8) Abrasion Resistance: The plastic marker shall have a maximum loss in weight of 0.25 grams in 500 revolutions when abraded according to Federal Test Method Standard No. 141a (Method 6192), using H—18 calibrate wheels with 1,000 gram load on each wheel.
- (9) Lateral Shock Load Test: A 3 inch x 6 inch plastic panel shall be applied to a 3 inch x 6 inch piece of carborundum extra coarse emery cloth, or its equivalent, so that 3 inch x 3 inch overlap occurs. The application shall be such that a pressure of 50 psi is placed on the panel for thirty (30) seconds. The overlap ends shall each be clamped and with one end on a fixed position, a sudden load of 50 lbs. shall be applied vertically to the other end. Upon immediate load release and examination, there shall be no noticeable slipping or fracture of the adhesive coating. This test shall be conducted at 70° — 80°F.
- (10) Adhesive Shear Strength: Specimens shall be tested according to the method described in ASTM D638 as modified to test the adhesive shear strength. The samples shall be prepared as follows: Plastic samples cut as described in paragraph B. (2), shall have applied to the adhesive face a 1 inch by 3 inch piece of carbonrundum extra coarse emery cloth, or its equivalent, so that there is 1 square inch overlap at one end of the plastic specimens.

A pressure of 50 psi shall be applied over this area for a period of thirty (30) seconds. Load is applied by gripping each end of the test piece in suitable tensile test machine such as a Dillon or Scott Tester. The average of the load required to break the adhesive bond shall not be less than 10 lbs. The speed of testing shall be 0.25 inch per minute. The test shall be conducted at temperature of 70° — 80°F.

C. Application Inlay for New Asphaltic Surfaces:

The plastic shall be capable of being applied to new asphaltic pavement immediately prior to the final rolling of the new surface, and of being rolled into place with conventional pavement and highway steel rollers.

The plastic and adhesive shall be of the type that the water used on the road roller to prevent asphalt pickup, shall not be harmful to the successful application of the plastic.

END OF SECTION

SECTION 713 STRUCTURAL TIMBER, LUMBER AND PILING

713—2.01 STRUCTURAL TIMBER, LUMBER AND PILING

Structural timber, lumber, and piling shall conform to the requirements of AASHTO M168.

END OF SECTION

SECTION 717

RESERVED

SECTION 719 STEEL, GRAY-IRON AND MALLEABLE-IRON CASTINGS

719—2.01 SCOPE

These specifications provide the requirements for steel, gray—iron and malleable—iron castings intended for various uses as shown on the plans.

719—2.02 GENERAL REQUIREMENTS

Steel gray—iron and malleable—iron castings manufactured under these specifications shall conform to the size and dimensions shown on the plans, shall be true to pattern in form and shall conform to the requirements set forth in the following specifications.

- | | | |
|----|--|------------|
| 1. | Carbon Steel Castings Grade 65—35 shall be furnished unless otherwise specified. | ASTM A 27 |
| 2. | Chromium Alloy Steel Castings Grade CA—15 shall be furnished unless otherwise specified. | ASTM A 296 |
| 3. | Gray—Iron Castings Class 30 shall be furnished unless | ASTM A 48 |
| 4. | Malleable Iron Castings Grade 35018 shall be furnished unless otherwise specified. | ASTM A 47 |

END OF SECTION

SECTION 724 SEEDS

724—2.01 DESCRIPTION

This specification provides the requirements for grass seed, listed herein, which are used to provide a living vegetative cover.

724—2.02 MATERIALS

The seed for this work shall be a mixture by weight as listed in the Special Provisions.

Seed which contains any of the following noxious weeds will be rejected: Field bindweed (*Convolvulus Arvensis*), Hoary cress (*Lepidium Drabal*), Russian Knapweed (*Centaurea Picris*), and Johnson grass (*Sorghum Halepense*).

All seed shall equal or exceed the percentages of sproutable seeds as specified. The percentages of germination and purity may vary slightly from the germination and purity as specified in Table 724—1, provided that the product of germination times the purity shall not fall below the minimum sproutable seed required. Whenever the purity of the seed falls more than 15 points below the percentage of purity specified, the seed will be rejected without running the germination test.

Seed shall be furnished in standard containers with seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content, clearly marked for each kind of seed.

The Contractor shall furnish four signed copies of a certificate certifying that each lot of seed has been tested by and approved laboratory within 6 months of date of application. This statement shall include: name and address of laboratory, date of test, lot number for each kind of seed, and results of test as to name, percentages of purity and germination, and percentage of weed content for each kind of seed furnished.

TABLE 724—1

Seed	Germination Period	Percent Purity	Percent Germination	Percent Sproutable Seed
Alsike Clover	14 days	98	90	88
White Dutch Clover	14 days	70	80	56
manchar Smooth Brome Grass	14 days	75	80	60
Common Ky. Blue Grass	14 days	85	77	65
Red Fescue	14 days	95	85	81

(Table Continued on Next Page)

TABLE 724—1
(Continued)

Seed	Germination Period	Percent Purity	Percent Germination	Percent Sproutable Seed
Creeping Meadow Foxtail (Alopecurus Arundinaceae)	14 Days	98	85	83
Oats	14 Days	85	80	68
Iceland Poppy	14 Days	70	80	56
Annual Rye Grass (Lolium)	14 Days	85	80	68
White Sweet Clover (Melilotus Alba)	14 Days	70	80	56
Yellow Sweet Clover (Melilotus Officinalis)	14 Days	70	80	56
Rapeseed	14 Days	70	80	56
Colonial Bent Grass	14 Days	95	85	81

END OF SECTION

SECTION 725 FERTILIZER

725—2.01 DESCRIPTION

Fertilizer shall be standard commercial fertilizer supplied separately or in mixtures, and furnished in moisture proof containers. Each container shall be marked with the weight and with the manufacture’s guaranteed analysis of the contents showing the percentage for each ingredient contained therein.

725—2.02 MATERIALS

The proportion of chemical ingredients of the commercial fertilizer to be used will be determined by laboratory analysis of the topsoil to which the fertilizer is to be applied.

The proportions of the chemical ingredients of the fertilizer furnished shall be a mixture such as to provide the total available nitrogen, phosphoric acid, and potassium as required by the soil analysis or as specified in the Special Provisions. The fertilizer shall contain slow release nitrogen and shall be supplied in the form of inorganic chemicals to the amount of at least 75% of the nitrogen carrying agents.

1. Tolerances of the chemical ingredients shall be plus or minus 2%.
2. No cyanamid compounds or hydrated lime will be permitted in mixed fertilizers.

Limestone shall contain not less than 85 percent of calcium and magnesium carbonates. Agricultural ground limestone suitable for application by a fertilizer spreader shall conform to the following gradation:

Sieve Designation	Minimum Per Cent Passing by Weight
No. 10	100
No. 20	90
No. 100	50

Fertilizer and limestone for use in a hydraulic sprayer shall be soluble or ground to a fineness that will permit complete suspension of insoluble particles in water.

END OF SECTION

SECTION 726 TOPSOIL

726—2.01 DESCRIPTION

Top soil shall be a well mixed material composed of sixty percent (60%) sandy silt soil and forty percent (40%) shredded peat. Top soil shall be free of sticks and clods of soil or clay. Top soil shall be free of stones greater than three-quarter inch (3/4") diameter and shall be free of deleterious quantities of salts or alkali.

The Contractor shall notify the Engineer of the location from which the Contractor proposes to furnish topsoil at least thirty (30) calendar days prior to delivery of topsoil to the project from that location. The topsoil and its source will be inspected and tested by the Engineer before approval will be granted for its use.

Unsuitable topsoil sources may be used if, prior to delivery to the project, sufficient organic matter in the form of pulverized peat moss or rich organic soil from other sources is thoroughly mixed with the topsoil to provide a product conforming to the above requirements. All topsoil shall be fertilized as follows:

- 1. The application rates of the fertilizer and limestone per 1000 square feet of ground area of topsoil furnished by the Contractor shall be determined by the Engineer, based on soil analysis tests so that the total natural and applied chemical constituents are as follows:

Nitrogen	1.0 lb minimum 1.5 lb maximum per 1000 sq. ft
Phosphoric Acid	1.0 lb minimum 2.0 lb maximum per 1000 sq. ft.
Potassium	1.0 lb minimum 2.0 lb maximum per 1000 sq. ft.
Limestone	Limestone requirements shall conform to Table 726—1

TABLE 726—1

Soil pH	Limestone Requirements Tons per Acre
Above 6.0	.0
5.0 — 6.0	1.5
Below 5.0	3.0

726—2.02 ORGANIC ADDITIVE

Organic material for incorporation into topsoil, if required, shall be partially decomposed fibrous or cellular stems and leaves of any of several species of Sphagnum mosses. Organic material may require chopping or shredding to insure thorough mixing with the topsoil.

END OF SECTION

SECTION 727 MULCH MATERIAL

727—2.01 DESCRIPTION

Material for mulching shall consist of the following types:

1. Jute Mesh Fabric
2. Natural Cellulose Wood Fiber
3. Dried Peat Moss

727—2.02 JUTE MESH FABRIC

Jute mesh shall be cloth of a uniform, open, plain weave of undyed and un— bleached single jute yarn. The yarn shall be of a loosely twisted one—half its normal diameter. Jute mesh shall be furnished in rolled strips and shall conform to the following requirements:

1. Width — 48 inches, plus or minus one inch.
2. 78 wrap—end per width of cloth (minimum).
3. 41 weld—ends per yard (minimum).
4. Weight to average 1.22 pounds per linear yard with a tolerance of plus or minus 5%.

Staples shall be U—shaped and shall be approximately six inches long and one inch wide. Machine—made staples may be of No. 11 gauge or heavier steel wire. Hand—made staples shall be made from 12 inch lengths of No. 9 gauge or heavier steel wire.

727—2.03 NATURAL CELLULOSE WOOD FIBER

Wood cellulose fiber mulch shall consist of a specially prepared wood fiber processed to contain no growth or germination inhibiting factors. The fiber mulch shall be manufactured and processed in such manner that the wood cellulose fibers will remain in uniform suspension in water under agitation and will blend with grass seed, fertilizer and other additives to form a homogenous slurry. The processed mulch material shall have characteristics to form a blotter—like ground cover on application, having moisture absorption and percolation properties and the ability to cover and hold grass seed in contact with soil.

The wood cellulose fiber mulch material shall be shipped in packages of uniform weight (plus or minus 5%) and bearing the name of the manufacturer and the air—dry weight content.

The wood cellulose fiber shall be dyed a suitable color to facilitate inspection of the placement of the material.

727—2.04 DRIED PEAT MOSS

The peat moss shall be non-toxic and capable of being suspended in water to form part of a homogeneous slurry. The material shall be chopped or shredded to allow distribution through normal hydraulic type seeding equipment. Peat moss shall be partially decomposed fibrous or cellular stems and leaves of any of several species of Sphagnum mosses, shall be free from woody substances and mineral matter such as sulphur or iron and it shall indicate a P value of not less than 4.0 and not greater than 6.5 It shall be furnished 'In an air dry condition and shall contain less than 35 percent moisture by weight. The water holding capacity shall not be less 800 percent by weight on an oven dry basis.

END OF SECTION

SECTION 729 FILTER CLOTH

729—2.01 GENERAL REQUIREMENTS

Filter cloth shall consist of linear polypropylene or polyethylene monofilament yarn, coated or uncoated, woven or unwoven, and formed into sheets of varying thickness. The length and width of sheets may be sized to meet manufacturer’s requirements. Transverse seams conforming to the strength requirements of the fabric of other plastic or metal may be woven into the cloth for reinforcing purposes, provided such fibers shall equal or exceed the durability of filter cloth. Non-woven fabric cloth shall be needle-punched or heat bonded.

DETAIL REQUIREMENTS. Filter cloth shall conform to the strength requirements of Table 729—1.

Filter cloth physical requirements for thickness, weight, percentage of open area, equivalent opening size, permeability and filtration shall be specified in the special provisions.

Filter cloth material will be accepted for conformance to the strength and physical requirements by certification. Either a manufacture’s certification or a certified copy of test results conducted by a qualified laboratory shall be furnished by the Contractor.

TABLE 729—1
FILTER CLOTH MINIMUM STRENGTH REQUIREMENTS (UN-AGED FABRIC)

Fabric Property	Testing Procedure	Brush Barrier and Silt Fencing		Gravel-Filled Drainage Structures		Embankment Reinforcement		RipRap Linear	
		Non Woven	Woven	Non Woven	Woven	Non Woven	Woven	Non Woven	Woven
Tensile Strength (lbs)	ASTM D 1682 (1)	90	90	100	90	100	200	200	200
Grab Elongation (%) Burst Strength (psi)	ASTM D 1682 (2)	_____	_____	15 Min. – 70 max.		_____	_____	_____	_____

(1) 1 square inch jaws and 12 inches/minute travel rate

(2) Mullen Mehtod

729—2.01 GENERAL REQUIREMENTS (Continued)

The filter cloth shall provide adequate water permeability while retaining soil fines. It shall have high strength and toughness, good puncture resistance, no wet shrinkage or growth, and good elongation resistance. It shall be resistant to rot, mildew, insects and chemicals. It shall conform to the following qualities:

SECTION 729 FILTER CLOTH (Continued)

729—2.01 GENERAL REQUIREMENTS (Continued)

<u>Property</u>	<u>Requirements</u>
Weight	3.9 oz./sq. yd. min.
Thickness	14.9 mils min.
Grab Strength	110 lbs. min.
Equivalent Opening Size	70 Mesh or smaller

END OF SECTION

SECTION 730 SIGN MATERIALS

730—2.01 ALUMINUM SHEET

The sheet aluminum shall be alloy 6061—T or alloy 5155—H36 as specified in ASTM B 209. The thickness of the aluminum sheet shall be as designated on the plans unless otherwise specified. Alloy and temper designations shall be certified by mill certification.

The aluminum base metal sheets shall be treated with chromate conversion coating for aluminum conforming to the requirements of ASTM B 449. Class 2. The cleaned and coated base metal shall be handled only by a mechanical device or by operators wearing clean cotton or rubber gloves. After cleaning and coating operations, the panels shall be protected at all times from contact or exposure to greases, oils, dust or other contaminants.

A sign panel shall be a continuous sheet for all lengths 72 inches or less in the horizontal direction. Sign panels longer than 72 inches may be constructed of more than one panel. No more than one vertical splice may be used for signs up to 144 inches in length and 48 inches or less in height. Sign panels larger than 48 inches in height may have more than one vertical splice.

The Dimensional Tolerance of the panels shall be 1/16 inch. Metal panels shall be cut to size and shape and shall be free of buckles, warp, dents, cockles, burrs, and any other defects resulting from fabrication. All possible fabrication, including shearing, cutting and punching of holes shall be completed prior to the base metal preparation.

730—2.02 PLYWOOD CONSTRUCTION AND MAINTENANCE SIGN PANELS

Plywood sign panels, which may be used for Construction and Maintenance Signs only shall be constructed of high density plywood, exterior type Grade B—C, or better and shall conform to the requirements set forth in “Products Standard PS 1—66 for Softwood Plywood, Construction and Industrial” published by the Products Standards Section of the U.S. Department of Commerce.

The overlay shall be of the high density type. It shall have a minimum weight of 60 pounds per thousand square feet of surface, shall be at least 0.012 inch thick before pressing and have a minimum resin content of 45% based on the dry weight of the impregnated fiber. The overlay shall have sufficient resin content to bond itself to the plywood.

Thickness — Single Panel Signs:	
Up to 18 inches inclusive in width	3/8inch min.
Over 18 inches to 48 inches inclusive in width	1/2inch min.
Over 48 inches in width	1/2inch min.
Plywood shields on destinations signs	3/8inch min.
Multiple Panel Signs	5/8inch min.

Painting of Sign Back. The sign back shall be primed with one coat of white exterior enamel undercoat and finished with one coat of white exterior enamel. The primer shall be as recommended by the supplier of the finish coat and shall be completely compatible.

Face Treatment. The surface shall be cleaned thoroughly with lacquer thinner, heptane, benzene, or solvent recommended by sheeting manufacturer. The surface shall be sanded with light sandpaper or steel wool and wiped dry and clean with clean cloth. Reflective sheeting shall then be applied.

The sheeting shall have a pre-coated adhesive backing protected by a removable liner and shall be either of the following two types as detailed on the plans or specified in the Special Provisions.

Type I enclosed lens sheeting shall conform to AASHTO M 268, except that Table 730—1 shall be substituted for Table 1.

Type II encapsulated lens sheeting shall conform to AASHTO M 268 and to the following additional requirements:

1. Color Requirements. Through Instrumental color testing the diffuse day color of the sheeting shall conform to the requirements of Table 730—2.
2. Reflective Intensity. The reflective sheeting shall have minimum reflective values at 0.2° and 0.5° divergence, as shown on Table 730—3, expressed as candlepower per foot candle per square foot.

TABLE 730—1
COLOR SPECIFICATION LIMITS AND REFERENCE STANDARDS
TYPE I SHEETING

Color	Chromaticity Coordinates* (Corner Points)								Reflectance Limits (% Y)		Ref. Std. (Munsell Papers)
	1		2		3		4		Min.	Max	
	x	y	x	y	x	y	x	y			
White**	.305	.290	.350	.342	.321	.361	.276	.308	35	-----	6.3GY 6.77/0.8
Red	.602	.317	.664	.336	.644	.356	.575	.356	8	12	8.2R 3.78/14.0
Orange	.535	.375	.607	.393	.582	.417	.535	.399	18	30	2.5YR 5.5/14.0
Brown	.445	.353	.604	.396	.556	.443	.445	.386	4	9	5.0YR 3/6
Yellow	.482	.450	.532	.465	.505	.494	.475	.485	29	45	1.25Y 6/12
Green	.135	.385	.175	.405	.155	.460	.110	.440	4	9	0.65BG 2.84/8.45
Blue	.147	.075	.176	.091	.176	.151	.106	.113	2	4	5.8PB 1.32/6.8

* The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 standard colorimetric system measured with standard illumination source C.

** Silver white is an acceptable color designation.

TABLE 730—2
COLOR SPECIFICATION LIMITS AND REFERENCE STANDARDS
TYPE II SHEETING

Color	Chromaticity Coordinates* (Corner Points)								Reflectance Limits (% Y)		Ref. Std. (Munsell Papers)
	1		2		3		4		Min.	Max	
	x	y	x	y	x	y	x	y			
White**	.303	.287	.368	.353	.340	.380	.274	.316	27	-----	5.0PB 7/1
Red	.613	.297	.708	.292	.636	.364	.558	.352	2.5	11	7.5R 3/12
Orange	.550	.360	.630	.370	.581	.418	.516	.394	14	30	2.5YR 5.5/14.0
Yellow	.498	.412	.557	.442	.479	.520	.438	.472	15	40	1.25Y 6/12
Green	.030	.380	.166	.346	.286	.428	.201	.776	3	8	10G 3/8
Blue	.144	.030	.244	.202	.190	.247	.066	.208	1	10	5.8PB 1.32/6.8

* The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 standard colorimetric system measured with standard illumination source C.

** Silver white is an acceptable color designation.

TABLE 730—3
MINIMUM SPECIFIC INTENSITY PER UNITY AREA (SIA)

(Candle Power Per Footcandle Per Square Foot)
TYPE III SHEETING
A—Glass Bead Retro—Reflective Element Material

Observation Angle (°)	Entrance Angle (°)	White	Red	Orange	Yellow	Green	Blue
0.2	-4	250	45	100	170	45	20.0
0.2	+30	150	25	60	100	25	11.0
0.5	-4	95	15	30	62	15	7.5
0.5	+30	65	10	25	45	10	5.0

Color Testing: Color testing shall be determined in accordance with ASTM E 97, “Standard Method of Test for 45-Degree, 0-Degree Directional Reflectance of Opaque Specimens by Filter Photometry”. (Geometric characteristics must be confined to illumination within 10 degrees of, and centered about, a direction of 45 degrees from the perpendicular to the test surface; viewing is within 15 degrees of, and center about, the perpendicular to the test surface. Conditions of illumination and observation must not be interchanged.) The standards to be used for reference shall be the MUNSELL PAPERS designation in Tables 730—1 and 730—2. The papers must be recently calibrated on a spectrophotometer. The test instrument shall be one of the following or approved equal:

1. GARDNER Multipurpose Reflectometer or Model XL20 Color Difference Meter.
2. GARDNER Model AC—2a Color Difference Meter or Model XL30 Color Difference Meters.
3. MEECO Model V Colorpiaster.
4. HUNTERLAB 025 Color Difference Meter.

Specular Gloss: The reflective sheeting shall have an 85 degree specular gloss of not less than 40 for types I and II when tested in accordance with ASTM D 523.

Color Processing: The sheeting shall permit cutting and color processing with compatible transparent and opaque process inks in accordance with the manufacturer’s recommendation at temperatures of 60°F to 100°F and relative humidity R.H. at 20 to 80 percent. The sheeting shall be heat resistant and permit force curing without straining of applies or unapplied sheeting at temperatures as recommended by the manufacturer. Color processing for Type III material shall be restricted to sheeting with heat activated adhesive backing unless otherwise recommended by the manufacturer.

Shrinkage: A 9 inch by 9 inch reflective sheeting specimen with liner shall be conditioned a minimum of 1 hour at 72°F and 50 percent relative humidity. The liner shall be removed and the specimen placed on a flat surface with adhesive side up. Ten minutes after liner is removed and again after 24 hours, the specimen shall be measured to determine the amount of dimensional change. The reflective sheeting shall not shrink in any dimension more than 1/32 inch in 10 minutes nor more than 1/8 inch in 24 hours.

Flexibility: Types I and II Sheeting Material: The sheeting, applied according to the manufacturer’s recommendations to a clean, etched 0.020 inch by 2 inch by 8 inch aluminum panel of alloy 6061—T6 conditioned a minimum of 48 hours and tested at 72°F and 50 percent relative humidity shall be sufficiently flexible to show no cracking when bent around a 3/4 inch mandrel.

Non-adhesive sheeting shall show no signs of cracking or crazing when flexed repeatedly over a 1/16 inch mandrel to 180° at 72°F.

Adhesive: The reflective sheeting shall include a pre-coated pressure sensitive adhesive backing (Class 1) or a tack-free heat activated adhesive backing (Class 2) either of which may be applied without necessity of additional adhesive coats on either the reflective sheeting or application surface.

The Class 1 adhesive shall be a pressure sensitive adhesive of the aggressive tack type requiring no heat solvent or other preparation for adhesion to smooth clean surfaces. The Class 2 adhesive backing shall be a tack-free adhesive activated by applying heat in excess of 175°F to the material as in the heat vacuum process of sign fabrication.

The protective liner attached to the adhesive shall be removed by peeling without soaking in water or other solvents without breaking, tearing or removing any adhesive from the backing. The protective liner shall be easily removed following accelerated storage for 4 hours at 160°F under a weight of 2.5 pounds per square inch.

The adhesive backing of the reflective sheeting shall produce a bond to support a 1 3/4 pound weight for 5 minutes, without the bond peeling for a distance of more than 2.0 inches when applied to a smooth aluminum surface and tested as specified in Section 718.

Impact Resistance: Type I and II reflective sheeting material, applied according to the manufacturer's recommendations to a cleaned, etched aluminum panel of alloy 6061—T6, 0.04 inches by 3.0 inches by 5 inches and conditioned for 24 hours at 72°F and 50 percent R.H., shall show no cracking when the face of the panel is subjected to an impact of a 2.0 pound weight with a 5/8 inch rounded tip dropped from a 10 inch pound setting on a Gardner Variable Impact Tester, 1G—1120.

Accelerated Weathering: When applied in accordance with recommended procedures, the reflective material shall be weather resistant and, following cleaning in accordance with manufacturer's recommendations, shall show no appreciable discoloration, cracking, blistering or dimensional change. Following exposure, the panels shall be washed with a 5% HCl solution for 45 seconds, rinsed thoroughly with clean water, blotted with a soft clean cloth, brought to equilibrium at standard conditions and tested. It shall have not less than the percent of the minimum SIA specified in the table below when subjected to accelerated weathering In accordance with ASTM G23, Type E or EH Weatherometer with the humidifier off.

Type of Material	Hours Tested	Minimum Specific Intensity Per Unit Area
I	1,000	50% of Table III
II	1,000	50% of Table IV

Splices in the Reflective Sheeting:

1. Vacuum applied sheeting. There shall be no splices in the reflective sheeting on panels with a minor dimension of 48 inches or less. On all rectangular signs with a minor dimension of more than 48 inches, the splice shall be horizontal.

2. Squeeze roller applied sheeting. No splices other than those occurring in the manufactured roll of reflective sheeting will be allowed, and no roll shall contain more than one splice for every 60 feet of material.
3. No sign shall have a splice within 2 inches of the sign edge. Where splices do occur, the adjoining reflective sheeting shall be color matched under both incident and reflective light.

Thickness. The thickness of the reflective sheeting without the protective liner shall be no more than 0.010 inch.

Solvent Resistance. After immersion in methyl alcohol, kerosene, turpentine, toluol, or zylol, the reflective sheeting, and tape shall show no evidence of dissolving, puckering, or blistering.

Edge Sealing. The edge of each completed reflective sheeting sign face and of all cut out letters, numbers, arrows, symbols, and borders shall be sealed in a manner and with a sealing solution as recommended by the manufacturer of the reflective sheeting.

Tensile Strength and Elongation. The reflective material shall have a tensile strength of not less than 5.0 pounds per inch of width. Elongation shall not be less than 10 percent.

Resistance to Heat, Cold, and Humidity. The reflective material, when exposed to heat, cold, and humidity shall not crack, peel, chip, or delaminate from the test panel.

Rainfall performance measurements shall be conducted in accordance with Standard rainfall test specified in the latest edition of Federal specifications L—S—300 and the brightness of the reflective sheeting totally wet by rain, shall not be less than 90% of the values in Table 730—2 and AASHTO M 268.

730—2.04 LETTERS, NUMERALS, ARROWS, SYMBOLS, BORDER

Letters, numerals, arrows, symbols, border, and other features of the sign messages shall be of the type, size and series shown on the plans or as specified by the Alaska Traffic Manual or the Alaska Sign Design Specifications.

Completed letters, numerals, and other units shall be formed to provide continuous stroke width and smooth edges and shall present a flat surface free of warp, blisters, wrinkles, burrs, and splinters.

The message shall be one of a combination of the following types:

1. Silk Screened or reverse silk screened with a “process paste” as supplied or recommended by the manufacturer of the reflective sheeting.
2. Type I, Class 1, cut-out reflective sheeting.
3. Type II, Class 1, cut-out reflective sheeting when specified on the plans.
4. Demountable Characters with Type II Reflective Sheeting when specified on the plans.

The Type II Reflective sheeting with letters, numerals, symbols, and borders shall be silver color unless otherwise specified on the plans.

The reflective sheeting shall be applied to 0.032-inch minimum thickness aluminum sheet conforming to ASTM B 209, Alloy 3003—H14.

Spacing of mounting holes for aluminum rivets or other approved non-corrosive fasteners shall be determined by character size and shape and in no case shall be more than 8 inches on center.

730—2.05 FRAMES

All rectangular signs, over 53 inches measured along the horizontal axis, and all diamond shape signs 60 inches x 60 inches and larger shall be framed unless otherwise specified. The frames shall be constructed of aluminum as indicated on the plans. All framing dimensions shall have a 1/8 inch tolerance unless otherwise specified.

The frame shall be affixed to the sign with 3/16 inch diameter aluminum rivets. The maximum rivet spacing shall be 12 inches on centers. No rivets shall be placed closer than 3/8 inch from edge of the aluminum face sheet.

All joints of the aluminum frame may be welded with an inert gas shielded — arc welding process using 4043 electrode filling wire in accordance with good shop practice. The width of the fillet shall be equal to the wall thickness of the smallest framing member being welded.

730—2.06 TEST PROCEDURES AND INSPECTIONS

Adherence. The test panel, after a 72 hour curing time, shall be immersed in 95°F.±3% water for a period of 24 hours. Immediately after removal from the bath, the reflective sheeting shall be sufficiently bonded so that it cannot be readily removed from the aluminum surface with a 1 inch round nose spatula. If the sheeting can be peeled rather than chipped from the surface, the bond is considered unsatisfactory.

Solvent Resistance. Test shall be in accordance with Federal Specification L—S—300B 4.3.6.

Accelerated Weathering. Test shall be in accordance with Federal Specification L—S—300B 4.3.9.

Resistance to Heat, Cold and Humidity. Test shall be in accordance with Federal Specification L—S—300B 4.3.10.

Tensile Strength and Elongation. Test shall be in accordance with Federal Specification L—S—300B 4.3.15.

730—2.07 POST MATERIALS

All Standard Regulatory, Warning, and Guide signs which are to be permanently installed shall have posts which conform with the following specifications. Standard Construction and Maintenance signs shall also be erected in accordance with the following specifications or on such supports as may be approved by the Engineer. Supports for Construction and Maintenance signs shall provide a stable, rigid mounting in compliance with Part VI of the Manual of Uniform Traffic Control Devices with Alaska Supplement and as detailed in the plans.

1. Metal Pipe Posts.

- a. Metal pipe posts shall be fabricated from steel pipe meeting the requirements of ASTM A 120, Standard Weight (Schedule 40). Post sizes shall be as designated on

the plans. Square posts shall have 7/16 inch diameter holes drilled or punched as necessary to permit mounting of the sign.

- b. All posts shall be hot dip galvanized in a manner conforming to Specification ASTM A 123 after fabrication. Any cutting of metal posts after hot dip galvanizing shall be accomplished with minimum damage to the zinc coating and all exposed surfaces shall be protected by treating the exposed area in the same manner as if it were abraded or damaged.
- c. Galvanized surfaces that are abraded or damaged at any time after the application of the zinc coating shall be repaired in accordance with AASHTO M 36.

2. Perforated Steel Posts

- a. Perforated steel post shall conform to the standard specifications for cold-rolled carbon steel sheets, commercial quality ASTM A—366. Sheets for post fabrication shall be zinc coated, commercial quality (1.25 oz.) conforming to ASTM A—525 in. U.S.S. Gauge steel, rolled to size and welded in the corner.
- b. All members shall be perforated for their entire length with 7/16 inch diameter holes on 1 inch centers.
- c. Furnished members shall be straight and shall have a smooth, uniform finish.
- d. It shall be possible to telescope consecutive sizes freely with a minimum of play. All perforations and cut off ends shall be free from burrs. Tube sizes shall be from 1 inch to 2 ½ inches in ½ inch increments. The length and tube size shall be as specified in the plans.

3. Finished Wooden Posts.

- a. Wooden post shall conform to Section 713, except that sweep (circular deviation from a straight line) shall not exceed 0.08 foot in 10 feet.
- b. Preservation Treatment. All wooden posts shall be pressure treated either with one of the following:

Pentachlorophenol in light oil solvent
Acid Copper Chromate
Ammoniacal Copper Arsenite
Chromated Copper Arsenate
Chromated Zinc Arsenite
Chromated Zinc Chloride
Copperized Chromated Zinc Chloride

All treatment shall be in accordance with the methods specified in Section 714, “Preservative Treatment for Wood Materials”, except that lumber posts for signs shall not be incised. The minimum retention of preservative shall be that specified for “Posts”.

- c. The cutting and drilling of wooden posts in the field will be permitted, provided that all cuts and holes shall be thoroughly swabbed, sprayed or brushed with two coats of the same type of preservative as initially used. At the time of applying wood preservative by swab, spray, or brush, the moisture content of the wood shall not exceed 25 percent and there shall be no

free moisture on the surface. Preservative applied during wet weather shall be adequately protected. Wood preservative shall be applied with suitable brush or by other means that will result in adequate penetration.

END OF SECTION

SECTIONS 731 – 799

RESERVED