

CITY OF IDAHO FALLS ENGINEERING DEPARTMENT STANDARD SPECIFICATIONS

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**CITY OF IDAHO FALLS
PUBLIC WORKS DIVISION
ENGINEERING DEPARTMENT**

**GENERAL CONDITIONS
OF THE
STANDARD SPECIFICATIONS
SECTION 100**

2010 EDITION

**GENERAL CONDITIONS
OF THE
STANDARD SPECIFICATIONS**

2010 EDITION

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GENERAL CONDITIONS

SECTION 100

100 - INTRODUCTION

These Standard Specifications are a part of the Contract Documents and shall be binding upon the parties signatory thereto, except for such stipulations as obviously are not applicable to the particular Contract or which have been specifically revised, modified, or supplemented by the terms and conditions of the Special Provisions, the Proposal, or any supplemental agreement.

101 - TERMS AND DEFINITIONS

In the interpretation of these Specifications and the other Contract Documents, or in any documents or instruments dealing with the construction operations governed by these Specifications, the following words, terms, and abbreviations, or the pronouns in place of them, shall each be construed as defined below. All Specifications and Test Methods of any Society, Association, or Organization herein referred to are hereby made a part of these Contract Documents, the same as if written in full. References to such Standard Specifications refer to the latest standards and tentative standards as are in force on the date bids for the project are received.

101.01 - Abbreviations

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

A.A.N.	American Association of Nurserymen
A.A.R.	Association of American Railroads
A.A.S.H.T.O.	American Association of State Highway and Transportation Officials
A.C.I.	American Concrete Institute
A.G.A.	American Gas Association
A.G.C.	Associated General Contractors of America
A.I.A.	American Institute of Architects
A.I.E.E.	American Institute of Electrical Engineers
A.I.S.C.	American Institute of Steel Construction
A.I.S.I.	American Iron and Steel Institute
A.N.S.I.	American National Standards Institute
A.P.W.A.	American Public Works Association
A.R.A.	American Railway Association

A.R.E.A.	American Railway Engineering Association
A.S.C.E.	American Society of Civil Engineers
A.S.L.A.	American Society of Landscape Architects
A.S.T.M.	American Society for Testing and Materials
A.W.P.A.	American Wood Preservers Association
A.W.W.A.	American Water Works Association
A.W.S.	American Welding Society
F.H.W.A.	Federal Highway Administration
F.S.S.	Federal Specifications and Standards, General Services Administration
I.E.S.	Illuminating Engineering Society
I.S.P.W.C.	Idaho Standards for Public Work Construction
M.U.T.C.D.	Manual Uniform Traffic Control Device
N.E.C.	National Electric Code
N.E.M.A.	National Electrical Manufacturers Association
N.R.M.C.A.	National Ready-Mix Concrete Association
O.S.H.A.	Occupational Safety and Health Agency
P.C.A.	Portland Cement Association
P.C.I.	Prestressed Concrete Institute
S.A.E.	Society of Automotive Engineers
S.S.P.C.	Steel Structures Painting Council
U.L.	Underwriter's Laboratory
U.S.A.S.I.	United States of America Standards Institute
W.A.Q.T.C.	Western Alliance for Quality Transportation Construction

101.02 - Terms

Unless otherwise stated, the words directed, required, permitted, ordered, instructed, designated, considered necessary, prescribed, approved, acceptable, satisfactory or words of like import refer to actions, expressions, and prerogatives of the Engineer.

101.03 - Definitions

101.03.1 - Addenda

Any written or graphic modification or interpretation of the Contract Documents issued prior to the bid opening by the City or an authorized representation thereof.

101.03.2 - Alley

A roadway designed to serve as a secondary access to side or rear of lots having a principal access on some other street. May not be used for principal access to any lot.

101.03.3 - Arterial Street

Any roadway designated by the City as part of the arterial system, which is intended to provide for the movement of traffic within, into, out of or through the City, and is not intended to provide access to private property.

101.03.4 - Base

The material placed above the subgrade to provide structural support to the surfacing.

101.03.5 - Bidder

An individual, firm, co-partnership, or corporation, or combination thereof, submitting a Bid Proposal for the work contemplated and acting directly or through a duly authorized representative.

101.03.6 - Bidding Documents

The contract, forms, specifications and plans for a particular project that comprise those documents given to a Bidder for bidding purposes.

101.03.7 - Bid Proposal

The written offer, on City prepared forms, of a Bidder to perform the proposed work in conformance with the Contract Documents. This term is used interchangeably with the term "Proposal".

101.03.8 - Bridge

Structures over twenty (20) feet (6.1m) in span, measured under the bridge seat or coping along the centerline of the roadway.

101.03.9 - Calendar Days

Every day shown on the calendar, Sundays and holidays included. Unless otherwise designated, days as used in the Contract Documents will be understood to mean Calendar Days-

101.03.10 - Certificate of Substantial Completion

A document from the City to the Contractor stating that major work on the Project has been completed and is ready for service. The guarantee period (usually one year) begins at the time this document is issued. Final payment or retainages are not to be paid until all work is completed and accepted.

101.03.11 - Change Order

A written order to the Contractor, covering changes in the Plans, Specifications, or quantities, within the scope of the Contract, and establishing the basis of payment and time adjustments for the work affected by the changes.

101.03.12 - City

City shall be the City of Idaho Falls, Idaho. This term is used interchangeably with the term "Owner". Unless the context indicates otherwise the term shall also include all agents, employees or officers of the City.

101.03.13 - Collector Street

Any roadway intended to provide for the movement of traffic between local and arterial streets, but which may provide access to private property.

101.03.14 - Commercial Street

Any local or collector street that is used to provide access to property that is not predominately zoned residential.

101.03.15 - Consulting Engineer

A licensed engineer or an authorized member of a licensed consulting engineering firm or organization, retained by the City for the design and/or the construction engineering of a specific project.

101.03.16 - Contract Documents

The written agreement between the City and the Contractor covering the performance of the work and the furnishing of all labor, materials, tools, and equipment in the construction of the work, including, but not limited to the Invitation for Bids, Bid Proposal, Contract, Payment and Performance Bond, Standard Specifications and Standard Drawings, Special Provisions or Plans and any change orders or supplemental agreements extending the work contemplated.

The Contract Documents are complementary and what is called for by one, shall be as binding as if called for by all. In case of discrepancies, Special Provisions shall prevail over Plans, Standard Specifications and Standard Drawings. Plans shall prevail over Standard Specifications and Standard Drawings. On Plans or Drawings, dimensions denoted by actual figures, shall govern over scale dimensions. In case of any ambiguity or dispute over interpretation of the provisions of the Contract, the decision of the Engineer shall be final.

101.03.17 - Contract Drawings

The official Drawings, Plans, Profiles, Typical Cross-sections, and Shop Drawings, Standard Drawings, or reproductions thereof, approved by the Engineer, that shows the location, character, dimension, and details of the work to be performed. All such documents are to be considered as part of the Plans, whether attached to the Specifications, or separate therefrom. This term is used interchangeably with the term "Plans".

101.03.18 - Contract Item

A specific unit of work for which a price is provided for in the Contract. Contract Items are labeled to correspond to these specifications or as items provided for in Special Provisions that are designated with the "SP-" prefix. This term is used interchangeably with the term "Pay Item".

101.03.19 - Contract Time

The number of calendar days allowed for the completion of the Contract. If a specific calendar date is shown in lieu of days, the Contract Time shall be completed by that date.

101.03.20 - Contractor

The Second Party, an individual, firm, co-partnership, and his, their, or its heirs, executors, administrators, successors, and assigns, or the lawful agent of any such individual, firm, partnership, covenantor, or corporation, or his, their, or its Surety, under the Contract Bond, constituting one of the principals to the Contract, and undertaking to perform the work herein specified. Where any pronoun is used as referring to the word "Contractor," it shall mean the Contractor as defined above.

101.03.21 - Culvert

Any structure with a span of twenty (20) feet (6.1m) or less measured along the centerline of the Roadway.

101.03.22 - Easement

A use of a designated part of property, authorized by the property owner, for another, in perpetuity.

101.03.23 - Engineer

The City Engineer of Idaho Falls, Idaho, or properly authorized Consulting Engineer, acting within the authority delegated to him by the City.

101.03.24 - Environmental Laws

The Comprehensive Environmental Response Compensation and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1986 ("CERCLA"); the Resource Conservation and Recovery Act, as amended by the Solid and Hazardous Waste Amendments of 1984 ("RCRA"); the Occupational Safety and Health Act ("OSHA"); the Emergency Planning and Community Right to Know Act of 1986 ("EPCRA"); the Solid Waste Disposal Act ("SWDA"); the Clean Air Act ("CAA"); the Federal Water Pollution Control Act ("FWPCA"); the Safe Drinking Water Act ("SDWA"); the Toxic Substances Control Act ("TSCA"), and any other similar state statutes or regulations (federal or state) promulgated pursuant to such statutes, for the purpose of regulating or

preventing the release or threatened release of any Hazardous or Toxic Substance into the environment.

101.03.25 - Equipment

All machinery and equipment, together with the supplies necessary for the upkeep and maintenance thereof, and all tools and apparatus necessary for the proper construction and acceptable completion of the Project.

101.03.26 - Extra Work

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

101.03.27 - Government Obligation

A public debt obligation of the United States Government or the State of Idaho and an obligation that principal and interest is unconditionally guaranteed by the United States Government or the State of Idaho.

101.03.28 - Hazardous Substance

This term shall have the same meaning as such term is defined in the Environmental Laws.

101.03.29 - Inspector

An authorized representative of the Engineer assigned to inspect the work performed or being performed, materials furnished or being furnished by the Contractor.

101.03.30 - Laboratory

The official testing laboratories of the City or such other testing laboratories as may be designated by the City.

101.03.31 - Local Street

Any roadway that is intended to provide access to private property and is not intended for the through movement of traffic.

101.03.32 - Materials

Any substance specified for incorporation in the Project.

101.03.33 - Notice to Proceed

A written notice to the Contractor showing the date he is to begin prosecution of the work under his Contract.

101.03.34 - "Or Equal"

In order to establish a basis of quality for some things in the work, certain processes, types of machinery and equipment, or kinds of materials may be mentioned on the Plans by designating a manufacturer by name, and referring to his brand or model numbers. Such mention is not intended to exclude other processes, equipment, or materials that will measure up to the designated standards of that mentioned. If the Contractor desires to use other products as equal thereto, he shall first secure the approval of the Engineer in writing before entering an order therefore. Wherever in the Specifications a manufacturer's name brand or model is mentioned, it is to be understood that the phrase "or equal" is assumed to follow thereafter, whether or not it does in fact.

101.03.35 - Owner

This term is used interchangeably with the term "City".

101.03.36 - Pavement

The uppermost layer of material, which contains a binding agent to maintain the structural integrity and location of the material, placed on the travelway for a riding surface.

101.03.37 - Pay Item

This term is used interchangeably with the term "Contract Item".

101.03.38 - Plans

This term is used interchangeably with the term "Contract Drawings".

101.03.39 - Project

Those areas of the Right-of-Way or other areas as shown by the Plans where all operations are to be performed by the Contractor, including the furnishing of materials, equipment, labor, tools, and incidentals, as required under the terms of the Contract Documents.

101.03.40 - Proposal

This term is used interchangeably with the term "Bid Proposal".

101.03.41 - Residential Street

A local or collector street that provides access to predominately residence zoned property.

101.03.42 - Right-of-way

A strip of land occupied or intended to be occupied by a street, sidewalk, railroad, public utility or other similar public use.

101.03.43 - Roadway

That portion of the Right-of-Way included between curbs and gutters or ditches intended primarily for vehicular traffic, including all appertaining structures and other features necessary for proper drainage, vehicular traffic movement and protection.

101.03.44 - Shop Drawings

Stress sheets, shop drawings, erection plans, false work plans, framework plans, coffer dam plans, electrical layouts, plumbing layouts, bending diagrams for reinforcing steel or any other supplementary plans of similar data which the Contractor is required to submit to the Engineer for approval. This term is used interchangeably with the term "Working Drawings".

101.03.45 - Special Provisions

The Contract requirements, as denominated hereafter, which are peculiar to the project and which are not otherwise thoroughly or satisfactorily detailed and set forth in the Standard Specifications, Standard Drawings or Plans.

101.03.46 - Specifications

The directions and requirements of the Standard Specifications and Standard Drawings as contained herein as supplemented by the Special Provisions as may be provided, pertaining to the manner of performing the work or the quantities or quality of materials to be furnished under the Contract.

101.03.47 - Standard Drawings

The terms and conditions of those documents adopted by the City as the City of Idaho Falls Engineering Department Standard Drawings.

101.03.48 - Standard Specifications

The terms and conditions of those documents adopted by the City as the City of Idaho Falls Engineering Department Standard Specifications.

101.03.49 - Structures

Structures shall consist of bridges, culverts, headwalls, retaining walls, cribbing, buildings, and any incidental construction items not otherwise defined herein.

101.03.50 - Subcontractor

An individual, firm, partnership, or corporation to whom the Contractor, with written consent of the City, sublets any part of the work covered by the Contract.

101.03.51 - Subgrade

The surface of the Right-of-Way upon which any structure, base or surfacing is placed.

101.03.52 - Superintendent

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

101.03.53 - Supplemental Contract Documents

A written Proposal and Agreement executed by the Contractor and the City, and accompanied by new Surety Bonds in the full amount of the Supplemental Contract covering additional work not included in the original Contract Documents.

101.03.54 - Surety

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

101.03.55 - Surfacing

The uppermost layer of material placed on the travelway.

101.03.56 - Surveyor

The Surveyor of Idaho Falls, Idaho, or properly authorized Consulting Surveyor, acting within the authority delegated to him by the City.

101.03.57 - Topsoil

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

101.03.58 - Toxic Substance

This term shall have the same meaning as such term is defined in the Environmental Laws.

101.03.59 - Traffic Control Devices

All signs, signals, barricades, guardrails, pavement markings, channelization, or other equipment or material used for the purpose of regulating, warning, and guiding traffic.

101.03.60 - Traffic Lane

The portion of the travelway for the movement of a single line of vehicles.

101.03.61 - Travelway

That portion of the roadway intended for movement of vehicles.

101.03.62 - Work

All the work specified, indicated, shown or contemplated in the Contract Documents as is needed to construct the project or improvement including all alterations, amendments, or extensions thereto, made by Contract Change Order or other written orders of the Engineer.

101.03.63 - Working Days

Any day except legal holidays, Saturdays, Sundays, and any City recognized holiday.

101.03.64 - Working Drawings

This term is used interchangeably with the term "Shop Drawings".

102 - BIDDING REQUIREMENTS AND CONDITIONS

The Plans, specifications, and other Contract Documents will govern the work. The Contract Documents are intended to be complementary and cooperative and to describe and provide for a complete project. Anything in the Specifications and not on the Plans, or on the Plans and not in the Specifications, shall be as though shown or mentioned in both.

102.01 - Proposal Contents and Form

Prospective Bidders will be furnished with Proposal forms which will state the location and description of the contemplated construction and will show the approximate estimate of the various quantities and kind of work to be performed and/or materials to be furnished with a schedule of items for which unit bid prices are asked.

102.02 - Examination of Plans, Specifications and Site of Work

The Bidder shall carefully examine the site(s) of the proposed work, the Bid Proposal, Plans, Special Provisions, Specifications, Addenda and all other contract forms pertinent to the project.

The submission of a Bid Proposal shall be conclusive evidence that the Bidder has made such examinations; has investigated and is satisfied as to the conditions to be encountered, the character, quantity, quality and scope of work, the quantities and qualities of material to be supplied, equipment and labor to be used; and fully understands the requirements of the Bid Proposal, Plans, Special Provisions, Specifications and Addenda applicable to the performance of all work.

The Bidder shall determine, from his own examinations of the project, the methods, material, labor and equipment required to perform the work in full and shall reflect the same in his bid prices.

Where the City has investigated the site of the proposed work (including investigation of possible sub-surface conditions), such investigative work is made only for the purposes of study and design.

Bidders may inspect any sub-surface boring logs made by the City in such investigations; however, such inspections are deemed solely for the Bidder's convenience and the City assumes no responsibility whatsoever for the accuracy or completeness of any investigations made, or any interpretations thereof. Any such records or boring or other sub-surface investigations are not part of the contract and there is no representation or warranty, expressed or implied, that any conditions interpreted from such investigations are correct, that different materials or moisture contents from those indicated will not be encountered, or that unanticipated developments will not occur. The availability of any such

information from the City shall not relieve the Bidder or the Contractor from the duty or responsibility of making his own examination or investigation as required by this Section, or of any other such responsibility under the contract.

All soils and test hole data, water table elevations, and soil analyses shown on the drawings, or included in the specifications, apply only to the specific test hole locations and to the depths indicated. Soil test reports, for test holes are available for inspection at the office of the City Engineer. Any additional sub-surface exploration shall be done by the Bidder or the Contractor at his or her own expense. The indicated elevation of the water table is that existing at the date the test hole data was obtained. It is the Contractor's responsibility to determine and allow for the elevation of the groundwater on the date(s) of actual project construction. A difference in elevation between groundwater shown in soil boring logs and groundwater actually encountered during construction will not be considered as a basis for claims for extra work or compensation.

NO INFORMATION DERIVED FROM ANY INSPECTION OF RECORDS OR INVESTIGATION MADE BY THE CITY WILL IN ANY WAY RELIEVE THE BIDDER OR CONTRACTOR FROM ANY RISK OR FROM PROPERLY PERFORMING HIS OBLIGATION UNDER THE CONTRACT.

102.03 - Inconsistencies and Omissions

In cases of conflicts in the requirements and provisions set forth in the contract, the specifications, or the plans, such conflict shall be reconciled by the acceptance of the following order of precedence for the various contract documents:

1. Permits of other Agencies
2. Bid Proposal of the Contractor
3. Special Provisions
4. The Plans
5. Standard Specifications and Drawings

If the Contractor, knowing of any conflict, error or omission prior to the correction thereof, proceeds with any work affected thereby, he shall do so at his own risk; the work so done shall not be considered as work done under the Contract and in the performance thereof, unless the same is subsequently completely approved and accepted by the City.

If any person contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of the Plans, Specifications, or other Contract Documents, he shall submit to the City a written request for an interpretation thereof. The person submitting the request will be responsible for

its prompt delivery, so that it reaches the City no less than five (5) working days prior to the date set for the opening of bids.

Any interpretation of the proposed Documents will be made by a written Addendum only and a copy of such Addendum will be mailed or delivered to each person receiving a set of Plans and Specifications. Each Bidder shall acknowledge receipt of each Addendum as a prerequisite to having the "Bid Proposal" considered. The City will not be responsible for other explanations or interpretations of the Contract Documents.

102.04 - Quantities and Unit Prices

The quantities for which unit prices are indicated in the Proposal form are approximate only and do not constitute a warranty or guarantee by the City as to the actual quantities involved for the work. Such quantities are to be used for the purposes of comparison of Bids and determining the amount of the Payment and Performance Bond. Contractor shall perform all work within the time specified in the Contract Document to complete the work, irrespective of whether the number of units stated in the Proposal Form is less than the actual number of units required to perform the work. The City also expressly reserves the right to make reasonable changes in design providing such changes do not materially change the intent of the basic Contract. Payment to the Contractor will be made only for the actual quantities of work performed and accepted in accordance with the Contract.

102.05 - Bidder Qualifications

The Bidder must be qualified by experience, financing, and equipment to do the work called for in the Plans and Specifications. Whenever required in the Special Provisions, the Bidder shall furnish upon a form provided for that purpose, a statement of his construction experience, financial capability, and his general ability to perform the work contemplated and shall submit the same along with his Bid Proposal. The City shall have the right to take such action as it may deem necessary in determining the ability of the Bidder to perform the work satisfactorily. Upon request of the City, a Bidder whose Bid is under consideration for award of a Contract shall submit promptly to the City satisfactory evidence of his financial resources, his construction experience, and his organization availability for the performance of the proposed Contract.

102.06 - Disqualifications of Bidders

The City, at its discretion, may determine that the Bidder is not responsible and reject the Bidder's Proposal for any of the following reasons:

1. More than one (1) Proposal on the same project from a Bidder under the same or different names.

2. Evidence of collusion with any other Bidder or Bidders. Participants in such collusion may also be disqualified from submitting Bids on any other work.
3. The Bidder has not satisfactorily performed the same or similar work previously.
4. Unsatisfactory performance record judged from the standpoint of conduct of workmanship or progress as shown by past or current work for the City.
5. Uncompleted work, whether for the City or otherwise, which might hinder or prevent the completion of the work bid on.
6. Financial inability of the Bidder to perform or complete the work bid on.
7. Inability or failure of the Bidder to meet any financial conditions as set forth in the Special Conditions or to provide adequate documentation thereof.
8. Failure of Bidder to pay or settle bills for labor or materials on any former or current Contracts.
9. Previous default in the performance of or failure to complete a written public works Contract.
10. Conviction of a crime arising from a previous public works Contract.
11. Failure to have and/or obtain all licenses and permits required by Federal, State and Local Laws, Regulations or Ordinances, or by the General Conditions or Special Conditions.
12. Bidder not authorized to do business in the State of Idaho.
13. Failure to submit a complete Bid Proposal and/or supporting documentation as set forth in the General Conditions or Special Conditions.
14. Any other inability, financial or otherwise, to perform the work bid on.
15. Failure to comply with state public works contractor's licensing, statutes, or conviction or disciplinary action as a result thereof.

102.07 - Preparation of Proposal

Each Bid shall be made on the forms furnished by the City and shall be signed by the Bidder with the signature in full. If the Proposal is made by a partnership, it shall contain the name of each partner and shall be signed in the firm name followed by the signature of the person authorized to sign. If a corporation makes the Proposal, it shall be signed in the name of the corporation by the Officer or Officers having authority to sign Contracts. The address and telephone number of the Bidder shall be typed or printed on the Proposal.

A unit or lump sum price as required in the Proposal shall be submitted on each item of work included in the group or division for which Bids are requested. Each unit or lump sum price shall be typed or written with ink in numbers. Any omission of the prices on items shown in the Proposal form or any addition in writing to the Form of Bid or any condition, limitation, or provision not officially invited in the Proposal or Special Provisions may render the Proposal as incomplete, informal, or modified, and may be cause for rejection of the Bid.

No oral or telephone proposals or modifications will be considered.

102.08 - Subcontractors

All subcontractors or persons not directly employed by contractor, who perform any portion of the work, shall be listed on the Proposal Form. Contractor shall not permit any subcontractor not listed on the Proposal Form to perform any portion of the work, without the express written approval by City. All subcontractors shall possess the necessary licenses and skills to perform the work and Contractor shall ensure the work performed by such subcontractors conforms to the Contract Documents. In the event any work is performed by a subcontractor in violation of this section, City may decline to pay for the same, even if such work conforms to the Contract Documents, and Contractor's rights to complete the work, may be terminated by City.

102.09 - Delivery of Proposals

Each Proposal or Bid shall be completely sealed in a separate envelope, properly addressed to the City at the address indicated on the Proposal form with the name and address of the Bidder and the name of the project for which the Bid is submitted plainly written on the outside of the envelope.

Proposals will be received at the time and place stated in the Advertisement for Bids. It is the sole responsibility of the Bidder to see that his Bid is delivered in time. Any Bid received after the scheduled closing time for receipt of Bids will be returned to the Bidder unopened.

Bids shall be submitted intact, including all Proposal Documents and the acknowledgment of all Addenda received from the City.

102.10 - Withdrawal or Revision of Proposal

A Bidder may without prejudice withdraw, modify, or correct a Proposal after it has been deposited with the City provided the modification or correction is filed with the City in writing or transmitted by written telegram or a signed facsimile, before the time set for the Opening of Proposals. The original Proposal as modified by such written, telegraphic or fax communication will be considered as the Proposal submitted by the Bidder.

No Bidder will be permitted to withdraw his Proposal between the closing time for the receipt of Proposals and the execution of the Contract, unless the award is delayed for a period exceeding thirty (30) calendar days.

102.11 - Irregular Proposals

Proposals may be considered irregular and may be rejected for the following reasons:

1. If the Proposal furnished is not used or is altered.
2. If there are unauthorized additions, conditional or alternate bids, or irregularities of any kind which may tend to make the Proposal incomplete, indefinite or ambiguous as to its meaning.
3. If the Proposals for two or more projects, advertised separately, are connected, or made contingent one upon the other, in such manner that the Proposal for any particular project shall carry a provisional deduction in the bid price on one or more of the other projects.
4. If the Bidder adds any unauthorized provisions reserving the right to accept or reject an award or to enter into a Contract pursuant to an award.
5. If the unit prices contained in the Proposal are obviously unbalanced, either in excess or below the reasonable cost analysis value.
6. If the proposal fails to contain a unit price written in numerals for every pay item indicated, except in the case of authorized alternate pay items.
7. Any erasure or alteration of figures of unit prices not initialed in ink by the Bidder.
8. If the Bid Proposal is not delivered at the place, time, and date specified.
9. If the Bid Proposal is not properly signed.

This list of irregularities is not exclusive and the City may reject any Proposal with other irregularities which do not conform to the Contract Specifications and which may give the Bidder an advantage over other Bidders.

102.12 - Pre-bid Conference

A Pre-bid conference, if scheduled, is intended to answer questions of Bidders and identify problems that may require an addendum. Some bids may call for voluntary attendance, while others may require mandatory attendance if the Pre-bid conference is designated "mandatory" then the City may reject any Bid Proposal received from a Bidder who did not attend the Pre-bid conference, notwithstanding that the Bid Proposal otherwise conformed to the Contract

Specifications. If a pre-bid conference is to be held, it shall be specified in the "Advertisement for Bids".

102.13 - Bid Opening

At the time and place set for the opening and reading of the Proposals as indicated in the Invitation for Bids, each and every Proposal, except those which may have been withdrawn in accordance with the appropriate section, received prior to the scheduled closure time for receipt of Proposals, will be publicly opened and read aloud.

All items and totals will be tabulated and, in the event of error, the corrected totals shall be considered the official total. The low Bid will be determined on the basis of the aggregate sum of the items as carried in the Proposal. The City reserves the right to reject any and all Proposals.

102.14 - Bid Bond or Proposal Guarantee

A certified check, cashier's check, or Bid Bond in an amount equal to at least five percent (5%) of the total amount bid, including sales tax, must accompany each bid as evidence of good faith and as guarantee that if awarded the Contract, the Bidder will execute the Contract and give a Payment and Performance Bond as required. Checks shall be made payable to the Treasurer of the City or other official designated in the Specifications. Bonds shall be furnished by a Surety Company authorized to do business in the State of Idaho. Government obligations shall not be acceptable as bid security.

102.15 - Supplemental Proposals

If Supplemental Proposals are required due to the character of the improvement and uncertainties that may be encountered during construction, Bidders shall submit supplemental bids on all items as shown on the Supplemental Proposal. The Bidder shall bid on all alternates on the Proposal form as provided therein. When bidding on an alternate for which there is no charge, he shall insert the words "No Charge" in the space provided on the Proposal form. The unit price Contract Bid shall be full compensation for the furnishing of labor, tools, and equipment that may be required under the several items listed and shall be a basis for final settlement.

Only the Proposal for the basic Contract shall be considered in determining the lowest and best bid. The Supplemental Proposal shall not be considered in this determination, unless it is so provided in the Special Provisions.

102.16 - Laws and Ordinances

The Bidder is assumed to be familiar with all Federal, State, and Local Laws, Ordinances and Regulations, which in any manner affect those engaged or employed in the work or the materials or the equipment used in the proposed construction, or which in any way affect the conduct of work and no plea of misunderstanding will be considered because of his ignorance thereof. If the Bidder or Contractor shall discover any provision in the Plans, Specifications, or Contract that is contrary to or inconsistent with any law, ordinance, or regulations, he shall forthwith report it to the City in writing.

103 - AWARD AND EXECUTION OF CONTRACT

103.01 - Award of Contract

The Award of Contract, if to be awarded, shall be made within thirty (30) calendar days after the date of Opening of Bids, to the lowest Bidder deemed responsible by the City. The successful Bidder will be notified, by telephone or by letter mailed to the address shown on his Proposal, that his Bid has been accepted and that he has been awarded the Contract.

However, the award may be deferred beyond thirty (30) calendar days by mutual written agreement between the City and lowest qualified bidder.

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

103.02 - Return of Proposal Guarantee

After the contract is awarded and executed by the successful Bidder, and all required Payment and Performance Bonds have been delivered to the City by the successful bidder, the City will return the Bid Security accompanying the Proposals submitted by all bidders, including the successful bidder.

103.03 - Execution of Contract

Within ten (10) days after the Bidder receives notification of the Award of Contract, as evidenced by his receipt from the City of the properly prepared Contract Documents, the Bidder to whom the award is made, shall execute and return the Contract in the required number of copies and shall furnish a Payment and Performance Bond (and any other required bonds and insurances) satisfactory to the City.

103.04 – Subcontractors – No Contractual Relationship

Nothing contained in the Contract Documents shall imply any contractual relation between any subcontractor and the City.

103.05 - Payment and Performance Bond

Unless otherwise indicated in the Request for Proposal, at the time of delivery of the executed Contract, the Contractor shall furnish to the City:

1. A Performance Bond in the amount of eighty-five percent (85%) of the Contract amount conditioned upon the faithful performance of the Contract in accordance with the Contract Documents, or government obligations having a par value equal to or greater than the amount of the required Performance Bond; and
2. A Payment Bond in the amount of eighty-five percent (85%) of the Contract amount, solely for the protection of persons supplying labor or materials to the Contractor or his subcontractors in the prosecution of the work provided for in the Contract, or government obligations having a par value equal to or greater than the amount of the required Payment Bond.

Each such Bond shall be executed by a Surety Company or Companies duly authorized to do business in the State of Idaho and must be satisfactory to the City. Each Bond must be approved by the City Attorney. If at any time prior to acceptance of the work and any warranty period provided in the Contract Documents, the par value of such Bond decreases to a value less than the required amount, then the successful Bidder shall upon request of written demand of the City Attorney deposit additional security or government obligations sufficient to comply with the security amount requirements. Such deposit shall be made within ten (10) days after receipt of such demand by the City Attorney.

Government obligations furnished by Contractors in compliance with the Idaho Public Contracts Bond Act (Idaho Code Section 54-1925 et.seq.) and must be approved by the City Attorney. The City, upon approval of the government obligations, shall deposit them in a national or state chartered bank or other depository as designated by the Treasurer of the State of Idaho, which bank or depository shall serve as Trustee. Any Contractor furnishing such government obligations shall execute an irrevocable power of attorney authorizing the Trustee to release such obligations to the City and authorizing the City to collect or sell such obligations if the Contractor fails to faithfully perform the Contract in accordance with the Contract Documents or fails to pay any persons supplying labor or materials to the Contractor or his subcontractors in the prosecution of the work provided for in the Contract. Such agreement or power of attorney shall be in a form acceptable to the City Attorney. The Contractor shall pay any and all fees as may be required by the Trustee in connection with its obligations or services as Trustee.

103.06 - Failure to Execute Contract

For failure to enter into the Contract and/or to furnish both the necessary Payment Bond and Performance Bond within the time specified, the Proposal Guarantee which accompanied the Bid, whether in the form of Bond or Check, shall be forfeited to the City. The award may then, at the discretion of the City, be made to the next lowest responsible Bidder or the work may be readvertised and constructed under Contract or it may be accomplished as the City may decide.

103.07 - Contractors Insurance

The Contractor shall not commence work under the Contract or under any special condition until he has obtained all insurance coverage's and all necessary permits as required in the following paragraphs, and until insurance certificates under any such coverage have been approved by the City, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurances required of the subcontractor have been obtained and approved.

NOTICE TO PROCEED shall not be issued until the Contractor has furnished to the city a Certificate of Insurance executed by insurance companies authorized to do insurance business in Idaho certifying that policies of insurance as required by the Contract have been duly issued to the Contractor and its subcontractors. This paragraph applies to all insurance required by the Contract, including, but not limited to, Worker's Compensation Insurance.

103.08 - Worker's Compensation Insurance

The Contractor shall procure and maintain during the life of this Contract, Worker's Compensation Insurance for all of his employees, employed at the site of the project and in case of any work that is sublet, the Contractor shall require the subcontractor, similarly, to provide Worker's Compensation Insurance for all the latter's employees unless such employees are covered by the protection afforded by the Contractor. In case any class of employees engaged in hazardous work under this Contract at the site of the project, is not protected under Worker's Compensation statutes, the Contractor shall provide and shall cause such subcontractor to provide compensation insurance with a private company in an amount equal to that provided by the Worker's Compensation statute for the protection of his employees not otherwise protected.

103.09 - Public Liability and Other Insurance

The Contractor shall obtain and keep in force during the term of the Contract, Public Liability and Property Damage Insurance in companies and in a form to be approved by the City. Said insurance shall provide coverage to the Contractor, any subcontractor performing work provided by this Contract, and the

City. The City shall be named as an additional insured on said policy insofar as the work and obligations performed under the Contract are concerned. The coverage so provided shall protect against claims for personal injuries, including accidental death as well as claims for property damages, which may arise from any act or omission of the Contractor or the subcontractor, or by anyone directly or indirectly employed by either of them.

The minimum policy limits of such insurance shall be as follows:

BODILY INJURY LIABILITY COVERAGE with limits of not less than \$500,000.00 combined single limit, or as required in the Special Conditions, for bodily injury and death, and PROPERTY DAMAGE COVERAGE in an amount of not less than \$100,000.00 for each occurrence.

Before commencing work on any building or housing project having a project cost of more than \$50,000.00 the Contractor shall submit written evidence that he has obtained, for the period of the Contract, BUILDER'S RISK "ALL-RISK" COMPLETED VALUE INSURANCE COVERAGE upon the entire project which is the subject of the Contract and including completed work and work in progress. Such insurance shall include as Additional Named Insureds, the City, the Engineer, and his Consultants and each of their officers, employees and agents, and any other persons with an insurable interest designated by the City as an Additional Named Insured. Such insurance may have a deductible clause, but the amount of deductible shall not exceed \$500.00.

103.10 - Contractor Indemnification

The Contractor agrees to save the City harmless from all losses and damage occasioned to it or to any third person or to property by reason of any acts or omissions on the part of the Contractor, subcontractors, agents, and employees in the performance of the Contract and will, after reasonable notice thereof, defend and pay the expense of defending any suit which may be commenced against the City by any third person alleging injury by reason of such acts or omissions and will pay any judgment which may be obtained against the City in such suit.

103.11 - Fire Insurance

If required in the SPECIAL PROVISIONS, the Contractor shall insure for the life of the Contract against all loss or damage by fire at the sites and against all loss or damage covered by the standard extended coverage insurance endorsement. Both the City and the Contractor shall constitute the named insured on the policy. The amount of the policy may vary with the extent of the work completed and shall at all times be at least equal to the amount previously paid for work and materials plus the value of the work or materials furnished or delivered by the Contractor, but not paid for by the City. Certificates of the

insurance companies as to the amount and extent of coverage's shall be delivered to the City before partial payments are made.

Insurance coverage specified herein constitutes the minimum requirements and said requirements shall in no way lessen or limit the liability of the Contractor under terms of the Contract. The Contractor shall procure and maintain at his own cost and expense any additional kinds and amounts of insurance that in his judgment may be necessary for his proper protection in the prosecution of the work. Self-insurance by the Contractor will not be acceptable.

103.12 - Protection of Contractors Work and Property

The Contractor shall protect his work, supplies, and materials from damage due to the nature of the work, the action of the elements, trespassers, or any cause whatsoever until the completion and the acceptance of the work. Neither the City nor any of its officers, employees, or agents assumes any responsibility for collecting indemnity from any person or persons causing damage to the work of the Contractor.

103.13 - Preconstruction Conference

A Preconstruction Conference may be held by the City after all the contractual forms have been fully executed. No statements or representations made by the City at the Preconstruction Conference shall be binding upon the parties nor shall afford a basis or reliance or estoppel by either party.

103.14 – Authority to Sign Pay Estimates And Change Orders

Prior to commencement of work the Contractor shall provide written notification to the City Engineer identifying who has authority to sign and / or approve change orders and pay estimates.

104 - SCOPE OF WORK

104.01 - Intent of Contract

The intent of the Contract is to prescribe a complete work or improvement which the Contractor undertakes to do in full compliance with the revisions and requirements of the Contract. The Contractor for all or any part shall furnish all labor, materials, tools, equipment, transportation, necessary supplies, and incidentals required to make each and every item complete as contemplated by the Contract. Any deviation from these requirements must be stipulated in the Special Provisions.

104.02 - Changes and Extra Work

The City may change the Plans, Specifications, character of the work, or quantity of work, provided the total arithmetic dollar value of all such changes, both additive and deductive, does not exceed twenty-five (25) percent of the Contract Price. Should it become necessary to exceed this limitation, the change shall be by written supplemental agreement between the Contractor and the City.

Change Orders shall be in writing and shall state the dollar value of the change, the established method of payment, any adjustment in Contract time, and when negotiated prices are involved shall provide for the Contractor's signature indicating his acceptance.

The Contractor may request changes in specified methods of construction. All such requests shall be in writing and directed to the Engineer. The request shall state the nature of the changes, the reasons therefore and the amount of any additional compensation necessary for the Contractor to perform the work in accordance with the requested changes. The Contractor shall not perform any work in accordance with any requested changes in specified methods of construction without prior written approval of the Engineer. No charge for extra work resulting from Contractor requested changes in specified methods of construction shall be allowed unless the Engineer has given written approval of the extra work and compensation therefore prior to the beginning of the performance of such extra work. The Contractor may request changes in the Plans and Specifications which do not materially affect the work and which are not detrimental to the work or the interest of the City. All such requests shall be in writing and directed to the Engineer. Such requests may be granted by the City to facilitate the work, upon prior written approval by the Engineer. The request shall state the nature of the changes in the Plans and Specifications; the reasons therefore; the extra work, if any, necessary to perform the work in accordance with such changes; and the additional compensation, if any, requested by the Contractor.

The Contractor shall not make any changes in the Plans and Specifications nor perform any work in accordance with such changes without

prior written approval of the Engineer. No charge for extra work resulting from changes in the Plans and Specifications requested by the Contractor shall be allowed unless the Engineer has given written approval of the extra work and compensation therefore prior to the beginning of the performance of such extra work.

Any extra work made necessary by alteration of or additions to the Plans or by other reasons for which no price is provided in the Contract, shall be performed by the Contractor as directed by the Engineer and he shall be compensated therefore as elsewhere provided herein.

Extra work which by reason of its character or extent is covered by a Supplemental Agreement between the City and the Contractor must have the written consent of the Surety on the Bond, but extra work and change orders not covered by Supplemental Agreement will not require the consent of the Surety.

104.03 - Changed Conditions

Should the Contractor encounter subsurface or latent physical conditions at the site which differ materially from those indicated in the Contract, or unknown physical conditions of an unusual nature that differ materially from those originally encountered or generally recognized as inherent in the work of the character provided for in the Contract, which change or unusual conditions will be considered by the Contractor as the basis for a claim for extra compensation, the Contractor shall promptly notify the Engineer in writing. The notice shall state the nature of the alleged condition, the nature and extent of any extra work expected to result from the alleged condition and the amount of extra compensation claimed. Changed conditions that occur as a result of any negligence or inattention on the part of the Contractor or his agent shall not be considered eligible for extra payment.

If the Engineer is not given prior written notice of said alleged changed conditions prior to commencement of the work, the Contractor shall be deemed to have waived any claim or claims for extra compensation in any matter arising out of the alleged changed or unusual condition.

If the City shall determine the conditions to be such as to justify a claim for additional compensation, it may provide for additional payment as specified in section "Payment for Extra Work", for the particular phase of work in question, or by any other equitable arrangement mutually agreed upon by the City and the Contractor and consented to in writing by the Surety to the Bond. In any event, the Contractor shall not be relieved from his obligation of resuming construction operations pending decisions as to the validity of a claim or pending the execution of a negotiated agreement to cover the additional cost of a claim.

104.04 - Protests

If the Contractor considers any work demanded of him to be outside the scope of the Contract or considers any ruling of the Engineer to be unfair, he shall upon such work being demanded or such ruling being made, proceed immediately to perform the work or to conform to the ruling, but within ten (10) days after the date of receipt of the instructions or ruling, he shall file a written protest with the Engineer stating clearly and in detail the basis of his objection, and include an itemized statement of any extra costs which may have resulted. Except for such protests or objections as are made of record in the manner herein specified and within the time limit stated, the records, rulings, instructions, or decisions of the Engineer shall be final and conclusive. If the Contractor fails to file such written protest within such time frame, then the Contractor shall be deemed to waive all objections to such ruling and any right to additional compensation therefore.

105 - CONTROL OF WORK

105.01 - Authority of Engineer

It is understood and agreed by and between in the parties hereto that the work concluded in the Contract is to be done in accordance with the Plans and Specifications and to the satisfaction of the Engineer. The Engineer shall determine the unit quantities and the classification of all work done and materials furnished under the provisions of the Contract. The Engineer may appoint assistants and inspectors to inspect the materials used and the work performed.

Nothing contained in the Contract shall be construed as requiring the Engineer to direct the method or manner of performing the work. The Engineer will make periodic visits to the site of the project to observe the progress and quality of the work and to determine, in general, if the work is proceeding in accordance with the intent of the Contract Documents. He will not be required to make comprehensive or continuous construction reviews to check quality or quantity of the work and compliance with the Plans and Specifications, and he or his inspectors or representatives will not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the work. Visits and observations made by the Engineer shall not relieve the Contractor of his obligation to conduct comprehensive inspections of the work and to furnish materials and perform acceptable work, and to provide adequate safety precautions, in conformance with the intent of the Contract. The fact that a Contractor's error goes undetected during a construction review does not relieve the Contractor of the responsibility for the discovery of his own errors and the correction of them nor of the responsibility of properly performing the work.

The approval by the Engineer of any drawing or any method of work proposed by the Contractor shall not relieve the Contractor of any of his responsibility for any errors therein and shall not be regarded as any assumption of risk or liability by the City or any officer or employee thereof, and the Contractor shall have no claim under the Contract on account of the failure or partial failure or inefficiency of any Plan or methods approved. Such approval shall be considered to mean merely that the Engineer has no objection to the Contractor's using, upon his own full responsibility, the Plans or methods proposed.

Any Plan or method of work suggested by the Engineer to the Contractor, but not specifically specified or required, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor, the Engineer and the City shall assume no responsibility therefore.

105.02 - Engineer's Representative

The Engineer may appoint representatives to inspect all materials used and all work done. Such inspections may extend to any or all parts of the work and to the preparation or manufacture of the materials to be used. The representatives will not be authorized to revoke, alter, enlarge, relax, or revise any of these Specifications. The representative is placed on alert to set the necessary lines and grades and to keep the Engineer informed as to the progress of the work and the manner in which it is being done; also, to call to the attention of the Contractor any deviations from the Plans or Specifications, but failure of the representative or the Engineer to call the attention of the Contractor to faulty work or infringement upon the requirements of the Plans or Specifications shall not constitute acceptance of said work. The representative will not be authorized to approve or accept any portion of the work or to issue instructions contrary to the Plans and Specifications. The representative will have the authority to reject defective material and to suspend any work that is being improperly done, subject to the final decision of the Engineer. The representative will exercise such additional authority as may, from time to time, be especially delegated to him by the Engineer.

105.03 - Administrative Cooperation

The Contractor will be supplied with a minimum of two (2) sets of approved Plans and Contract Documents, one (1) set of which the Contractor shall keep available on the project 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 inspectors, and other Contractors in every way possible.

The Contractor shall have on the project at all times, as his 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 authorized representatives. The Superintendent shall have full authority to execute the orders or directions of the Engineer without delay, and to promptly supply such materials, equipment, tools, labor and incidentals as may be required. Such a Superintendent shall be furnished regardless of the amount of work sublet. The Contractor shall accomplish at least 20% of the total monetary value of the Contract with his own forces and equipment.

105.04 - Cooperation Between Contractors

The City reserves the right at any time to Contract for or perform other additional work on or near the work covered by the Contract.

Bidders are required to inform themselves fully of the conditions relating to the construction and labor under which the work will be or is now being performed, and the Contractor shall employ, as far as possible, such methods and means in the carrying out of his work as will not cause any interruption or interference with any other Contractor or agency.

When separate Contracts are let within the limits of or adjacent to any one (1) project, each Contractor shall conduct his work so as not to interfere with or hinder the progress or completion of the work being performed by other Contractors. The Contractors working on the same project shall cooperate with each other as directed by the Engineer.

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

The Contractor shall arrange his work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractor(s) within or adjacent to the limits of the same project. He shall join his work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others as directed by the Engineer.

105.05 - Notifications Relative to the Contractor's Activities

The Engineer will initially notify the agencies concerned as to the time Bids will be called and the approximate time of starting work. The Engineer will also define what the project consists of and will point out particular problems. The Contractor shall be responsible for making detailed notifications as follows:

The Contractor shall provide individual businesses affected by the project with notification one (1) week prior to the start of construction. The Contractor shall provide public notice of the project forty-eight (48) hours prior to the start of construction. Public notice shall be through the local news media, specifically the local newspaper, a local radio station and a local television station. All notices shall contain the Project name, the Contractor's name, the Contractor's phone number, the type of work to be performed, tentative start and end of construction, and any anticipated disruption of services. Any changes that may affect the start or end of construction by more than one week shall require renotification of the public and all businesses of the changed schedule. The above notifications may be waived if the City determines it to be unnecessary.

The Contractor shall be responsible to notify all pertinent agencies such as School District Bus personnel, INL Bus personnel, Fire Department, Police Department, Sanitation Department, U.S. Post Office, etc. of any road closures, detours, etc. which might affect their normal operations. Such notice should be

provided with enough time for those agencies to provide notice to and reschedule their affected personnel and customers.

105.06 - Construction Stakes, Lines and Grades

The work shall be done in strict conformity with the Plans and Specifications and to the lines and grades established by the Engineer and shall be in accordance with such additional instructions as may be given by the Engineer. The Contractor shall protect and preserve in their original position all stakes, points, or marks set for the work by the Surveyor or Engineer. If such stakes and marking are carelessly destroyed or defaced by the Contractor's operations before their usefulness is ended, the full cost of replacing them shall be at the Contractor's expense by deduction from any money due him.

The Contractor shall provide sufficient and safe facilities to enable the Engineer to set the control points for structure work such as bridges, piers, towers, and other similar work where control points need to be set above ground level.

Any claim by the Contractor for extra compensation by reason of alterations or reconstruction work allegedly due to error in the Surveyor or Engineer's line and grade will not be allowed unless the original control point set by the Surveyor or Engineer still exists or unless other satisfactory substantiating evidence is provided that reasonably proves the existence of said error was furnished by the Surveyor or Engineer.

The Contractor shall keep the Engineer informed in advance as to when and where he intends to work, thus enabling the Surveyor or Engineer to set the Engineering control points, lines, and grades with a minimum of delay and interference. If the schedule of the work is such as to handicap the setting of the necessary Engineering control, the Contractor shall suspend his operations at the particular place in sufficient time for the Surveyor or Engineer to complete his urgent work. Any additional expense to the Contractor arising from the temporary suspension of work shall be considered as incidental to the construction and shall be included in the various Bid items of the Contract.

105.07 - Removal of Unsatisfactory or Unauthorized Work

Unsatisfactory work whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work shall be removed immediately and replaced in an acceptable manner and with acceptable materials.

The Engineer may condemn defective work or material any time before the final acceptance of the work. The Engineer shall give notice of such condemnation in writing. Such condemned work shall be immediately removed and disposed of to the satisfaction of the Engineer. Failure or neglect on the part

of the Engineer to condemn unsatisfactory material or reject inferior workmanship will in no way release the Contractor from his responsibility to provide an acceptable product nor shall it be construed to mean the acceptance of such work.

No work shall be done without lines and grades having been given by the Surveyor or Engineer. Work done contrary to and without regard for the instructions of the Engineer, work done beyond the lines shown on 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.

Any deviation made from the Plans and Specifications without written authority will be considered unauthorized and done at the expense of the Contractor and will not be measured or paid for by the City.

Upon the failure of the Contractor to forthwith comply with any written order of the Engineer made under the provisions of this section, the Engineer will have the authority to cause any resulting unacceptable work to be remedied or removed and replaced, and any unauthorized work to be removed, and thence to deduct the cost of same from any monies due or to become due to the Contractor.

105.08 - Utility Facilities

Prior to awarding the Contract, the City will notify all effected utilities to move such of their installations as will be within the confines of the finished improvement. Under some circumstances, however, the work of the utilities may have to be performed during the construction of the project. It shall be the responsibility of the Contractor to coordinate his work with that of the utilities in such manner as to cause the least possible interference and as may be further provided in the Special Provisions.

The Contractor shall support and protect by timbers or other acceptable means, all pipes, conduit, poles, wires, or other apparatus which may in any way be affected by the work and shall do everything to support, sustain, and protect the same under, over, or along said work. In case any of said pipes, conduits, poles, wires, and apparatus should be damaged by the willful or negligent conduct of the Contractor, the authorities having control of the same shall repair them and the expense of such repairs shall be charged to the Contractor.

All utility services shall be maintained in such a manner as to cause the least inconvenience to the property owner. Should utility service be disrupted as a result of the Contractor's operations, the Contractor shall provide service to the property owner even when not actually working on that project and shall be

responsible for maintaining service to the property owner until the project is completed.

The Contractor shall further be responsible for any damage done to any street or other public property or to any private property by reason of the breaking of any water pipe, sewer or gas pipe, electrical conduit, or other utility occasioned by the willful or negligent conduct of the Contractor.

It is herewith provided that no utility, private or public, shall be moved solely to accommodate the Contractor's equipment or his method of operation when such utility does not interfere with the improvements under construction, unless the cost of such removal be done at the expense of the Contractor.

The Contractor's work shall be confined to the City's premises including easements that a construction permit limits whenever possible. He shall not enter on or place material on private premises except by written consent of the individual owners and he shall save the City harmless from all suits and actions of every kind and description that might result from his use of private property.

Underground utilities of record, except service lines will be shown on the Construction Plans insofar as it is possible to do so. These utility locations, however, are shown of convenience only and the City assumes no responsibility for improper location or failure to show utility locations on the Construction Plans.

The Contractor shall be required to request a location of all utilities prior to commencement of any phase of construction. This location must be obtained for utilities within the city limits by calling 529-1250 and scheduling a "Locate". Additional locations in the same area for a specific utility should be arranged with the individual utility at the time of the scheduled "Locate". The Contractor shall be responsible for maintaining a record of these locations for use during construction.

The Contractor shall take adequate precautions to protect existing lawns, trees, and shrubs outside the rights-of-way, sidewalk, curbs, pavement, utilities, adjoining property, and structures and to avoid damage thereto. He shall at his own expense completely repair any damage thereto that has been caused by his operations, to the satisfaction of the Engineer except as otherwise provided in other Sections of these Specifications.

105.09 - Inspection of Work

All materials furnished by the Contractor shall be subject to the inspection and approval of the Engineer any time during the progress of the work and until final completion thereof. 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. The materials shall be delivered by the Contractor sufficiently in advance of the work to enable the

Engineer to make the proper tests and inspections. As soon as materials have been tested and inspected, the Contractor shall immediately move all rejected materials from the work to such place distant therefrom as the Engineer may require and shall arrange for replacement of such rejected materials at his own expense.

The Engineer may direct the Contractor to remove or uncover portions of the finished work. After examination, the Contractor shall restore said portions of the work to the standards required by the Specifications. Should the work thus exposed or examined prove acceptable, the uncovering or removing, 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. The neglect or failure on the part of the Engineer to condemn or reject inferior materials or work shall not be construed as an acceptance of the materials or work.

When any unit of government or political subdivision or any utility is to pay a portion of the costs of the work covered by this Contract, its respective representative shall have the right to inspect the work. Such inspection shall in no sense make any unit of government or political subdivision or utility a party to this Contract and shall in no way interfere with the rights of either party hereunder. The expense of uncovering and replacing of covering shall be borne by the Contractor or the inspecting entity as set forth above.

The Contractor shall furnish at his own expense such labor and facilities as may be required to enable the Engineer to make a thorough inspection and culling of the materials.

In lieu of inspection, the City may require certified statements from the producer as to the quality.

105.10 - Maintenance of Work; Risk of Loss

The Contractor shall maintain the work during construction and until the work is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces to the end that the project is kept in satisfactory conditions at all times. Contractor shall bear all risk of loss or materials, supplies or equipment associated with or part of the work, until a Certificate of Substantial Completion is executed and delivered to Contractor.

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

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

The work occasionally involves such items as buildings, machinery, or other mechanical equipment and/or the setting of same or may otherwise be of such a nature that it is desirable to have the Contractor maintain or guarantee the work for a period of time greater than one (1) year after final acceptance by the Engineer.

When such maintenance or guarantees are desired by the City, that are not specifically provided for in these Specifications, the requirements and terms shall be defined in the Special Provisions. Such maintenance or guarantees shall not affect any manufacturer's warranties. See the section "Public Liability and Other Insurance" for requirements covering "All Risk" insurance unless the City waives such.

The Contractor shall be responsible for the entire improvement and shall maintain it until the City has accepted it. The City reserves the right to utilize any portion of the improvement prior to final acceptance and in such event; the City will assume responsibility for its repair in the case of damage.

105.11 - Verbal Agreements

No verbal agreement or conversation with any officer, agent, or employee of the City, either before or after execution of the Contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the Contract. Any such verbal contract shall be considered as unofficial information and shall in no way be binding upon the City.

105.12 - Final Inspection

The Engineer will not make the final inspection until all work required by the Contract, including final clean-up and all extra work ordered by the Engineer has been completed. After the final inspection has been satisfactorily completed, the City shall submit the Certificate of Substantial Completion.

In order that the Engineer may determine whether the Contractor has complied with those requirements of this Contract, compliance with which is not readily ascertainable through inspection and tests of the work and materials, the Contractor shall at any time requested, submit to the Engineer, properly authenticated documents or other satisfactory proofs as to his compliance with such requirements.

106 - CONTROL OF MATERIALS

106.01 - Source of Supply and Quality Requirements

Promptly after the approval of the award, the Contractor shall notify the Engineer of the proposed sources of Contractor provided materials. At the option of the Engineer, the source of supply of each of the materials shall be approved by the Engineer before the delivery is started. The Engineer may require representative preliminary samples of the character and quality prescribed which shall be submitted by the Contractor or Producer for examination and testing by the Engineer. Only materials conforming to the requirements of these Specifications and approved by the Engineer shall be used in the work. Any of the materials proposed to be used may be inspected or tested at any time during their preparation and use. If, after testing, it is found that the sources of supply that have been approved do not furnish a uniform product or if the product from any source proves unacceptable at any time, the Contractor shall furnish approved materials from other approved sources. No material, which after approval, has in any way become unfit for use shall be used in the work.

Used or second-hand materials, parts, and equipment may be used only if permitted by the Special Provisions.

106.02 - Samples and Tests

All materials test reports submitted by the Contractor for review by the Engineer shall indicate that the tests were performed in accordance with recognized standards of national societies, associations and institutes or Idaho Transportation Department methods.

The Engineer or an independent materials testing firm approved by the Engineer will perform Field tests of materials. The approved independent testing firm shall perform the quantity and type of tests specified in the contract documents. The independent testing firm shall be employed by the Contractor. Costs associated with the testing done by the independent testing firm shall be paid by the Contractor and considered incidental to related contract items. All tests shall be in accordance with AASHTO, ASTM, W.A.Q.T.C., or Idaho Transportation Department methods.

The Contractor shall furnish without charge such samples of all materials as may be requested by the Engineer. Materials shall not be used until the Engineer has approved them. Samples will be secured and tested whenever necessary to determine the quality of the materials. Materials shall be delivered on the work in advance in such quantities as to afford the Engineer an opportunity to make tests before the materials are to be used.

Certain materials may be accepted on the basis of the manufacturer's or fabricator's certification, in a form acceptable to the Engineer, and signed by the

person in responsible charge, certifying that the material was manufactured in accordance with and meets all Specification requirements. The existence of a manufacturer's certification will not preclude the Engineer from separately sampling and testing the material or from making his final acceptance or rejection of said material or facilities on the basis of his separate test results.

106.03 - Plant Inspection

The Engineer may undertake the inspection of materials at the source. In the event source or plant inspection is undertaken, the following conditions shall be met:

1. The Engineer shall have the cooperation and assistance of the Contractor and the Producer from whom materials have been contracted.
2. The Engineer shall have full entry at all times to such parts of the plant as may concern the manufacture or production of materials being furnished.
3. Adequate safety measures shall be provided and maintained.

It is understood that the Engineer reserves the right to retest all materials which have been tested at the source of supply after the same have been delivered to the Project Site and to reject all materials which, when retested, do not meet the requirements of the Contract.

106.04 - Storage of Materials

The Contractor shall store all materials intended for use in the work by means that will prevent damage from exposure to the elements, from admixture of foreign material, or from damage by any other cause. The Engineer will refuse to accept, or to sample for testing, any materials that are improperly stored. Stored materials, even though approved for storage, may again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate inspection. Approved portions of the right-of-way and material sources may be used for storage purposes and for the placing of the Contractor's plant. Private property shall not be used for storage purposes without prior written permission of the owner of the private property or his authorized representative, and if requested by the Engineer, copies of such written permission shall be furnished to the City. All materials shall be handled in such manner as to preserve their quality and fitness for the work.

106.05 - Defective Materials

All materials not conforming to the requirements of these Specifications will be rejected by the Engineer and all such materials, whether in place or not, shall be immediately removed from the site of the work by the Contractor.

106.06 - Field Laboratory

When required, the Contractor shall provide an inspector's shelter or field laboratory consisting of a suitable building in which to house and use equipment necessary to perform the required tests.

107 - LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

107.01 - Laws and Regulations

The Contractor shall observe and comply with all Federal, State, and Local Laws, Regulations, Ordinances, and orders and all decrees of bodies or tribunals exercising proper jurisdiction and authority. He shall at all times observe and comply with all applicable laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the City and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree whether by himself, his employees, or his subcontractors.

107.02 - Labor

Only competent workers shall be employed on the work. Any person employed who is found to be incompetent, intemperate, troublesome, disorderly, or otherwise objectionable, or who fails or refuses to perform his work properly and acceptably, shall be immediately removed from the work by the Contractor and not be reemployed on the work.

The Contractor, his agents, and employees shall be bound by and shall comply with all Federal, State, and Local Laws related to civil rights, discrimination, wages and/or salary, working conditions, health and safety rules and regulations, and other laws relating to labor or workplace safety. Violations of such laws shall be considered as due cause for cancellation of the Contract.

In Contracts involving Federal Aid Funds, the above requirements shall not be enforced in such a manner as to conflict with or be contrary to the Federal Statutes prescribing a labor preference to honorable discharged members of the Armed Forces of the United States and prohibiting as unlawful any other preference or discrimination among citizens of the United States.

107.03 - Permits and Licenses

The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes and shall keep fully informed of all Local Ordinances, State and National Laws, in any manner effecting the work herein specified. He shall be responsible for all violations of the law, for any cause, in connection with the construction of the work, or caused by obstruction of the work, or caused by obstructing streets, sidewalks, etc. and he shall give all requisite notice to public authorities. A copy of each permit or license will be furnished the City.

107.04 - Licensing of Contractors

Bidders shall be licensed in the State of Idaho by the Idaho Public Works Contractors State License Board in the Class and Type specified for the value and scope of work to be done or with a license in the Class and Type specified for work greater than the value and scope of work to be done in accordance with the provisions of Title 54, Chapter 19, Idaho Code as amended. On projects involving Federal Funds, the Bidder shall possess or obtain a license in the Class and Type above mentioned prior to the award of the Contract. On projects not involving Federal Funds, the Bidder shall possess a license in the Class and Type above mentioned prior to submitting his Bid for said Project.

The Class of License specified for the value of the work to be done is as follows:

- Class AAA License - For the work, the estimated cost or price of which exceeds \$3,000,000.00.
- Class AA License --- For the work, the estimated cost or price of which is not more than \$3,000,000.00.
- Class A License ----- For the work, the estimated cost or price of which is not more than \$1,000,000.00.
- Class B License ----- For the work, the estimated cost or price of which is not more than \$500,000.00.
- Class C License ----- For the work, the estimated cost or price of which is not more than \$100,000.00.
- Class D License ----- For the work, the estimated cost or price of which is not more than \$50,000.00

Well drillers shall be licensed as stated above and in addition shall possess or obtain a license from the Department of Water Administration in accordance with Section 42-238, Idaho Code.

107.05 - Patented Devices, Materials and Processes

The Contractor shall be liable for all suits brought against the City by reason of infringement of patented rights on any material, machine, or appliance that he may use on the work or incorporate in the finished job, except where specifically exempted by the Special Provisions. Unit prices named in the Proposal shall include payment of royalties, if any.

107.06 - Use of Premises, Rights-of-way and Easements

The Contractor shall confine his equipment, storage of materials, and operation of work to the limits indicated by law, ordinances, permits, or the direction of the Engineer and shall not unreasonably encumber the premises with his materials.

Property lines, limits of easements, and limits of construction permits are indicated on the Plans and it shall be the Contractor's responsibility to confine his construction activities within these limits unless he makes arrangements for use of private property. Before using any private property adjoining the work, the Contractor shall file with the Engineer; a written permission of the property owner and upon vacating the premises, the Contractor shall furnish the Engineer with a release from all damages, properly executed by the property owner.

The Contractor shall provide and maintain, on a twenty-four (24) hour basis, all necessary safeguards such as watchmen, warning signs, barricades, and night-lights at his own expense. Special care shall be exercised to prevent vehicles, pedestrians, and livestock from falling into open trenches or being otherwise harmed as a result of the work. The Contractor shall in all cases hold the City harmless for any and all damages resulting from any of his operations.

The costs of any emergency safeguards or action that must be undertaken by the City for the safety of the public shall be regarded as a legitimate charge against the Contractor.

107.07 - Protection and Restoration of Existing Improvements

The Contractor shall be responsible for the preservation of all public and private property and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer has witnessed or otherwise referenced their location and shall not move them until so directed by the Engineer.

The Contractor shall be responsible for the protection of both public and private property adjacent to the work and shall exercise due caution to avoid damage to such property.

The Contractor shall repair or replace all existing improvements within the right-of-way which are not designated for removal (e.g., curbs, sidewalks, driveways, fences, walls, signs, utility installations, pavements, structures, etc.) which are damaged or removed as a result of his operations; except when a portion of a sprinkling system within the right-of-way must be removed, the remaining lines shall be kept and restored to usability. Repairs and replacements shall be at least equal in quality to the original existing improvements and shall match them in finish and dimension unless otherwise approved by the Engineer.

Trees, lawns, and shrubbery that are not to be removed, shall be protected from damage or injury. If damaged or removed because of the Contractor's operation, they shall be restored or replaced in as near the original condition and location as is reasonably possible. Lawns shall be reseeded and covered with suitable mulch.

The Contractor shall give reasonable notice to occupants or owners of adjacent property to permit them to salvage or relocate plants, trees, fences, sprinklers, and other improvements that are within the right-of-way and which are designated for removal and would be destroyed because of the work.

All costs to the Contractor for protecting, removing, and restoring such existing improvements shall be absorbed in his Bid prices for the various project items.

107.08 - Public Convenience and Safety

The Contractor's operation shall cause no unnecessary inconvenience to the public. The access rights of the public shall be considered at all times. Unless otherwise authorized, traffic shall be permitted to pass through the Work or detour plan approved by the City and provided by the Contractor shall be required. Major arterials shall have one (1) lane in both directions open and be properly signed at all times, and all lanes must be in service from 3:30 p.m. to 8:30 a.m. unless prior approval of the Engineer is obtained in writing or an emergency situation occurs.

Safe and adequate pedestrian and vehicle access shall be provided and maintained to fire hydrants, commercial and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, hospitals, and other establishments of a similar nature. Access to these facilities shall be continuous and unobstructed unless otherwise approved by the Engineer.

Vehicular access to residential driveways shall be maintained to the property line except when necessary construction precludes such access for reasonable periods of time. If backfilling has been completed to such extent that safe access may be provided, and the street is opened to local traffic, the Contractor shall immediately clear the street and driveways and provide and maintain access.

The Contractor shall cooperate with the various parties involved in the delivery of mail and the collection and removal of trash and garbage to maintain existing schedules for these services.

Existing traffic and street name signs, which may interfere with construction, shall be removed by the Contractor and stored in a safe place. These signs shall not be removed until the Engineer has so directed and until the Contractor has taken the necessary measures to safeguard traffic after the signs have been removed. Preservation and maintenance of the signs and the traffic control and direction associated therewith shall be the sole responsibility of the Contractor. Upon completion of the project, the Contractor shall reset all such signs in their permanent locations or shall make arrangements with the City for the installation of new signs if the old signs are in poor condition.

The Contractor in such manner as to provide a reasonably satisfactory surface for traffic shall conduct grading operations, roadway excavation, and field construction. When rough grading is completed, the roadbed surface shall be brought to a smooth, even condition satisfactory for traffic.

The Contractor shall take every precaution to protect pedestrian and vehicular traffic. Whenever in the opinion of the Engineer, the Contractor has not provided sufficient or proper safety precautions and safeguards, he shall do so immediately and to whatever extent the Engineer deems advisable; however the failure of the Engineer to advise the Contractor of an improperly signed or unsafe condition shall not relieve the Contractor from his responsibility to continuously and conscientiously protect the public at all times.

The posting of flagmen, or the placing of warning signs, regulatory signs, barricades, traffic cones, flashers, etc. shall all be done in accordance with the current edition of the Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways, published by the U.S. Department of Transportation, Federal Highway Administration. The erection and removal of traffic control devices shall be approved by the Engineer.

The Contractor shall absorb in his Bid all costs for the above requirements.

107.09 - Use of Explosives

When the use of explosives is necessary for the prosecution of the work, the Contractor shall exercise the utmost care not to endanger life or property and the explosives shall be handled, used, and stored in accordance with all applicable regulations.

When the use of explosives is necessary, the Contractor shall have a special clause in his insurance permitting the blasting. Vehicles conveying the explosives and/or storage places shall be clearly marked "Dangerous - Explosives". No explosive shall be left in an unprotected manner along or adjacent to any public thoroughfare or public place.

The Engineer's approval of the use of explosives shall not relieve the Contractor from his liability for claims caused by his blasting operations.

107.10 - Sanitary Provisions

The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements and regulations of the State Department of Health and of other bodies or officers having jurisdiction thereof. He shall permit no public nuisance.

Sewage flow within any sewer system shall not be interrupted except as approved by the Engineer. Should the Contractor disrupt existing sewer facilities, sewage shall be conveyed in closed conduits and disposed of in a sanitary sewer system. Sewage shall not be permitted to flow in trenches or be covered by backfill.

107.11 - Disposal of Waste; Compliance with Environmental Laws

Contractor shall remove, transport and properly dispose of all asphalt, debris, and waste material removed from the work site as required under the terms and conditions hereof. All such removal, transportation and disposal shall be at Contractor's sole expense and shall be accomplished in accordance with all statutes, laws, regulations and ordinances of the United States government, the State of Idaho or other agencies or local governments having jurisdiction thereof. Before using, transporting, storing or handling any Hazardous Substance or Toxic Substance upon the work site, Contractor shall notify the City in writing of such intent. Such notice shall specifically describe the nature and qualities of such substances, the purpose for which they will be used and the precautions Contractor intends to employ in order to ensure such substances are not released into the environment. The City may require any additional precautions it deems necessary to ensure such release does not occur and that the use of such substances is in conformity with the Environmental Laws. Contractor shall be fully responsible to comply with the Environmental Laws while accomplishing the work.

Prior to the disposal of any hazardous chemical or regulated waste at any landfill, Contractor shall provide written proof satisfactory to the City that the operator of such landfill possesses all permits and licenses required by law in order to accept waste to be removed from the project site. Prior to acceptance of the work by the City, Contractor shall deliver to the City a certificate from the operator of any landfill wherein such waste has been delivered, stating that all such waste material has been properly disposed of in accordance with all such laws, statutes and regulations. Contractor shall hold the City harmless from all fines, penalties, costs, claims and demands of any kind, including attorneys fees and court costs, arising from any act or omission by Contractor while using, removing, transporting, storing or disposing of any Hazardous Substance, Toxic Substance or regulated waste at the project site.

107.12 - No Waiver of Legal Rights

The City shall not be precluded or estopped by any measurement, estimate, or certificate made either before or after the completion and acceptance of the work and payment therefor, from showing the true amount and character of the work performed and materials furnished by the Contractor, nor from showing that any such measurement, estimate, or certificate that is untrue or is incorrectly made, nor that the work or materials do not in fact conform to the Contract. The City 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 Sureties, or both, such damage as the City may sustain by reason of the Contractor's failure to comply with the terms of the Contract. Neither the acceptance by the City, or any representative of the City, 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 City shall operate as a waiver of any portion of the Contract or any power herein reserved, or any right to damages. A waiver of any breach of the Contract shall not be held to be a waiver of any other or subsequent breach.

107.13 - Personal Liability of Public Officials

Neither the Engineer, nor any of his assistants nor any officer of the City shall be personally responsible for any damages arising under or growing out of the Contract; It being understood that in all such matters, they act solely as agents and representatives of the City.

108 - PROSECUTION AND PROGRESS

108.01 - Construction Schedule and Commencement of Work

After Notification of Award, but prior to the start of any work, the Contractor shall submit to the Engineer for approval his proposed construction schedule. The construction schedule shall be in the form of a tabulation, chart, or graph and shall be in sufficient detail to show the chronological relationship of all activities of the project including, but not limited to, estimated starting and completion dates of various activities, procurement of materials, and scheduling of equipment. The construction schedule shall reflect completion of all work under the Contract within the specified time and in accordance with these Specifications.

The Contractor shall meet with the Engineer for a Preconstruction Conference at a time mutually established and at or before this meeting the Contractor shall submit the construction schedule for approval.

Unless otherwise provided, the Contract time shall commence upon the date specified in the Notice to Proceed. The work shall be diligently prosecuted to completion within the time provided in the Notice to Proceed.

Contractor shall keep the owner informed of the progress of the work at all times

108.02 - Prosecution of Work

To minimize public inconvenience and possible hazard and to restore streets and other work areas to their original condition and former state of usefulness as soon as practicable, the Contractor shall diligently prosecute the work to completion. If as determined by the Engineer, the Contractor fails to prosecute the work to such extent that the above purposes are not being accomplished, the Contractor shall upon orders from the Engineer, immediately take the steps necessary to fully accomplish said purposes. All cost of prosecuting the work as described herein shall be absorbed in the Contractor's Bid. Should the Contractor fail to take the necessary steps to fully accomplish said purposes after orders of the Engineer to do so, the Engineer may suspend the work in whole or in part, until the Contractor takes said steps.

As soon as possible under the provisions of these Specifications, the Contractor shall backfill all excavations and restore to usefulness all improvements existing prior to the start of the work.

If work is suspended through no fault of the City, all expenses and losses incurred by the Contractor during such suspensions shall be borne by him. If the Contractor fails to properly provide for public safety, traffic, and protection of the work during periods of suspension, the City may elect to do so with its own forces

or to hire another Contractor to do so and shall deduct the costs thereof from monies due the Contractor. Such action will not relieve the Contractor from liability.

108.03 - Suspension of Work

When, in the judgment of the Engineer, unfavorable weather makes it impractical to secure satisfactory results, or when other conditions warrant the granting of a suspension order, he shall issue to the Contractor a written order to suspend work wholly or in any part of the Contract. When conditions are again favorable for the prosecution of the work, the Engineer shall issue to the Contractor a written order to resume the suspended work. Orders to suspend work will not be written for intermittent shut downs due to weather conditions unless the suspension of work is to be for an extended period of time. The Contractor shall take every precaution to prevent any damage or unreasonable deterioration of the work during the time it is closed down.

Suspension of the work by the Engineer shall not furnish any grounds for claims by the Contractor for damage or extra compensation, but the period of such suspension shall be taken into consideration in determining the revised date for the project completion as hereinafter provided. The Contractor shall not suspend the work under the Contract without written order of the Engineer as stated in the preceding paragraph. The Contractor will be required to work a sufficient number of hours per day in order to complete the project within the number of days or time period specified. The question as to the necessity of discontinuing any portion of the work by reason of unfavorable weather conditions shall be determined by the Engineer.

Upon failure of the Contractor to carry out the orders of the Engineer or to perform work under the Contract in accordance with his provisions, the Engineer may suspend the work for such period, as he may deem necessary to rectify the situation. Time lost by reason of such failure or time lost replacing improper work or material shall not furnish any grounds to the Contractor for claiming an extension of time or extra compensation, and shall not release the Contractor from damages or liability for failure to complete the work within the time required.

If the Contractor finds it is impossible for reasons beyond his control to complete the work within the Contract time as specified or as extended in accordance with the provisions of this section, he may at any time prior to the expiration of the Contract time, make a written request to the Engineer for an extension of time setting forth therein reasons which he believes will justify the granting of his request. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the Engineer finds that the work was delayed because of conditions beyond the control and without the fault of the Contractor, he may extend the time of completion by such amount as the conditions justify. The extended time of completion shall be in full force and effect the same as though it were the original time for completion.

The Contractor shall not be entitled to any claim for damage because of unavoidable delays, but may be entitled to an extension of time in the above cases.

The City shall have the right at its discretion to extend the time for the completion of the Contract. Any extension of time requested by the Contractor for the consideration of the City shall be submitted in writing and if so requested, it shall be accompanied by the written consent to such extension by the Surety on the Bond.

108.04 - Failure to Complete on Time - Liquidated Damages

The Contractor expressly acknowledges that failure to complete the work in the time allowed will result in damages being sustained by the City. Such damages are, and will continue to be, impracticable and extremely difficult to determine. For each consecutive calendar day in excess of the time specified for completion of the work (as adjusted by change order), the Contractor shall pay to the City or have withheld from monies due him the amount specified in the Contract Documents as liquidated damages. By submitting a bid, Contractor expressly acknowledges that the amount of liquidated damages set forth elsewhere in the Contract Documents is a fair and reasonable estimate of the damages that will be suffered by the City in the event of any delay in the performance of the work. The Contractor further agrees that any such deduction shall not in any degree release him from further obligations and liabilities in respect to the fulfillment of the entire Contract. In the event City wrongfully and without just cause contributes to any delay in the prosecution of the work, or if the liquidated damages provisions of the Contract Documents are determined to be unenforceable for any reason, nothing herein shall prevent the City from recovering its actual or consequential damages caused by Contractor's delay in completing the work.

108.05 - Assignment of Contract

The Contractor shall not assign this contract or any part thereof, or any monies due or to become due thereunder, without the prior written approval of the City. The Contractor shall not sublet any part of this Contract without first having obtained a written consent of the Engineer to do so.

Request for permission to sublet, assign, or otherwise dispose of any portion of the Contract shall be in writing and accompanied by the consent of the Surety. In the event the consent is given, it shall in no way release the Contractor from any responsibility, but he shall be held in all respects accountable for the same as if no consent had been given. Notwithstanding the City's approval of such assignment the Contractor shall give his personal attention to the work, which is sublet.

108.06 - Default and Termination of Contract

The Contract may be canceled by the City without liability for damage when in the City's opinion the Contractor is not complying with the terms of the Contract in good faith, has become insolvent, or has assigned or subcontracted any part of the work without the City's consent. In the event of such cancellation, the Contractor will be paid the actual amount due based on the unit prices or lump sum bids and the quantity of work completed at the time of cancellation, less damages caused to the City by acts of the Contractor causing the cancellation. The Contractor, having tendered a Bid, shall be deemed to have waived any and all claims for damages because of cancellation of Contract for any reason. If the City declares the Contract canceled for any of the above reasons, written notice to the effect shall be served upon the Surety. The Surety shall, within ten (10) days, assume control and perform the work as successor to the Contractor.

If the Contractor fails to begin delivery of materials and equipment, to commence work within the time specified, to maintain the rate of delivery of material, to execute the work in the manner and at such locations as specified, or fails to maintain a work program which will ensure the City's interest, or if the Contractor is not carrying out the intent of the Contract, the Engineer's written notice may be served upon him and the Surety on his faithful Performance Bond demanding satisfactory compliance with the Contract.

If the Contractor or his Surety does not comply with such notice within ten (10) days after receiving it, or after starting to comply, fails to continue, the City may exclude him from the premises and take possession of all material and equipment, and complete the work, by the City's forces or by letting the unfinished work to another Contractor or by a combination of such methods. In any event, the cost of completing the work shall be charged against the Contractor and his Surety, and may be deducted from any money due or becoming due from the City. If the sums under the Contract are insufficient for the completion of the project, the Contractor or the Surety shall pay to the City all such costs in excess of the original Contract price.

If the Surety assumes any part of the work, it shall take the Contractor's place in all respects for that part, and shall be paid by the City for all work performed by it in accordance with the Contract. If the Surety assumes the entire Contract, all money due to the Contractor at the time of his default shall be payable to the Surety as the work progresses, subject to the terms of the Contract.

The provisions of this Section shall be in addition to all other rights and remedies available to the City under the law.

108.07 - Enforcement

If the Contractor defaults in the performance of any of the terms, conditions, covenants or agreements contained in the Contract Documents, the Contractor shall pay to the City all costs and expenses, including but not limited to a reasonable attorney's fee, including such fees on appeal, which the City may incur in enforcing the Contract or in pursuing any remedy allowed by law for breach thereof, whether such is incurred by the filing of suit or otherwise.

108.08 - Contractor's Superintendents and Equipment

All machinery and equipment shall be adequate for the purpose used and shall be kept in good workable condition and be operated by experienced operators.

The Contractor shall provide at all times during the progress of the work, competent and necessary superintendents. During the Contractor's absence, the Superintendent shall have full authority to execute the orders or directions of the Engineer without delay and to promptly supply such materials, tools, plant equipment and labor as may be required. All work under the Contract shall be performed under continuous supervision of competent personnel thoroughly experienced in the class of work specified. The lack of proper supervision by the Contractor or by his Supervisory personnel shall be just cause for the termination of the Contract as set forth in the Section "Default and Termination of Contract".

109 - MEASUREMENT AND PAYMENT

109.01 - Measurement of Quantities

All work acceptably completed under the Contract will be measured according to United States Standard Measure. The method of measurement and computations to be used in the determination of quantities of material furnished and the work performed under the Contract will be those methods generally recognized as conforming to good Engineering practice.

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

When used to specify the measurement of plates, the term "gauge" will mean the United States Standard Gauge, except when used to specify the measurement of galvanized or aluminum sheets used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing, the term "gauge" will mean that specified in AASHTO M 36, M 167, or M 196. When used to specify the measurement of wire, the term "gauge" will mean the wire gauge specified in AASHTO M 32.

Measurements shall be made as hereinafter provided unless provided for by their individual specifications.

109.01.1 - Volumetric Quantities

Volumetric Quantities shall be the product of the mean area of the vertical or horizontal sections and intervening horizontal or vertical dimensions. Volumetric quantities shall also be the area between computer generated surfaces. Structures will be measured according to neat lines shown on the plans or ordered in writing. Volumes of material in stockpiles will be determined by the cross section average end area method or the area between computer generated surfaces. Estimated quantities less than 100 cubic yards may be measured in the truck using a method determined by the Engineer and agreed to by the Contractor prior to delivery of the material.

The term "Thousand Foot Board Measure (MFBM)" for the measurement of timber and lumber shall be based on nominal widths and thicknesses and the extreme length of each piece actually incorporated in the structure.

The term "Gallon" is the U. S. Gallon and shall be the standard unit of liquid measure.

109.01.2 - Surface Area Quantities

Surface Area Quantities shall be the product of measurements or dimensions in horizontal planes. Structures will be measured according to neat lines shown on the plans or ordered in writing.

109.01.3 - Linear Quantities

Linear Quantities shall be determined from measurements or dimensions in horizontal planes, however, linear quantities of pipe, piling, fencing, guardrail, etc. shall be considered as being the true length measured along the longitudinal axis.

The term "Station" is one hundred (100) linear feet.

109.01.4 - Weight Quantities

Weight quantities shall be done on certified platform scales or when approved by the Engineer, on a completely automated weighing and recording system. The Contractor shall furnish the Engineer with duplicate licensed weighmaster certificates showing the actual net weights. The City will accept the certificates as evidence of weights delivered.

The term "Pound" is an avoirdupois pound.

The term "Ton" is two thousand (2,000) avoirdupois pounds.

The term "Sack or Bag" when used to measure cement is ninety-four (94) pounds.

109.01.5 - Unit Structure Quantities

When a complete structure or structural unit is specified as a unit of measurement, the unit will be construed to include all necessary fittings and accessories.

The term "Each" is usually a structural unit complete and in place which may be purchased in multiple quantities.

The term "Lump Sum" is usually a structural unit complete and in place which is purchased as a singular item.

When required by the Special Provisions or requested by the Engineer, the Contractor shall submit to the Engineer within fifteen (15) days after award of Contract a detailed schedule (in triplicate) to be used only as a basis for determining progress payments on a lump sum Contract or any designated lump sum bid item. This schedule should equal in total the lump sum bid and shall be

in such form and sufficiently detailed as to satisfy the Engineer that it correctly represents a reasonable apportionment of the lump sum.

109.02 - Scope of Payment

The Engineer shall, after award of the Contract, establish a monthly payment date during the life of the Contract, which will determine each working month. Each month, the Engineer shall make an approximate measurement of the work performed and estimate its value based on the Contract unit prices. Monthly payments will be made only for work actually performed and only for materials actually incorporated in the work. Monthly payments will not be made for any materials which have been delivered to the site, but which have not actually been incorporated in the work unless otherwise approved by the Engineer.

When the work has been satisfactorily completed, the Engineer shall determine the quantity of work performed and prepare the final estimate of the value thereof. Payment will be made only for work actually performed and only for materials actually incorporated in the work.

The Contractor shall accept the compensation, as herein provided, as full payment for furnishing all materials, labor, tools, and equipment necessary to the completed work and for performing all work contemplated and embraced under the Contract; also, for loss or damage arising from the nature of the work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work until the final acceptance by the City, and for all risk of every description connected with the prosecution of the work; also, for all expenses incurred in consequence of the suspension or discontinuance of the work as herein specified; and for completing the work according to the Plans and Specifications.

The payment of any monthly or final estimate shall not constitute a waiver by the City of any claim for defective work or material. Neither the payment of any estimate nor any retained percentage shall relieve the Contractor of any obligation to make good any defective work or material.

Payment will not be made for materials wasted or disposed of in a manner not called for under the Contract. This includes rejected material not unloaded from vehicles, materials rejected after it has been placed, and material placed outside of the Plan lines. Unless otherwise provided, no payment will be made for materials delivered to the site but not incorporated in the work. Such quantities will not be included in the final pay quantities. No compensation will be allowed for disposing of rejected or excess materials.

When any portion of the work is performed by the City at the Contractor's request, the cost thereof shall be charged against the Contractor, and may be deducted from any amount due or becoming due from the City.

The unit Contract prices for the various Bid items of the Contract shall be full compensation for all labor, materials, supplies, equipment, tools, and all things of whatever nature required for the complete incorporation of the item into the work, the same as though the item were read "In Place", unless the Plans and Special Provisions shall provide otherwise.

If within the time fixed by law, a properly executed notice to stop payment is filed with the City, due to the Contractor's failure to pay for labor or materials used in the work, all money due for such labor or materials will be withheld from payment to the Contractor in accordance with applicable laws.

109.03 - Payment for Extra Work

Adjustments, if any, in the amounts to be paid the Contractor by reason of any change, addition, or deduction, shall be determined by one (1) or more of the following methods:

1. By an acceptable lump sum Proposal from the Contractor.
2. By unit Contract prices contained in the Contract Proposal, or by unit prices mutually agreed upon by the Contractor and the City.
3. By force account.

The Contractor shall be solely responsible, before proceeding with any change, for satisfying himself that the change has been properly authorized in behalf of the City. No charge for extra work or any other change in the Contract will be allowed without prior written authorization by the City, which shall state the extra work or change authorized and the compensation allowed for such extra work or as a result of such change or the method of computing such compensation.

When payment for extra work is by lump sum, agreed price(s), or by unit prices mutually agreed upon by the Contractor and the City, the Contractor shall include in such agreed upon prices any and all applicable taxes on taxable materials used in such work.

109.04 - Notice of Potential Claim

The Contractor shall not be entitled to any additional compensation otherwise payable for any act or failure to act by the Engineer or the City, the happening of any event or occurrence, or any other cause, unless he shall have given the Engineer a written notice of potential claim.

The written notice of potential claim shall set forth the reasons for which the Contractor believes that additional compensation will or may be due, the nature of the costs involved, and insofar as possible, the amount of potential claim. If based on an act or failure to act by the Engineer or the City, except in case of emergency, such notice shall be given to the Engineer prior to the time

that the Contractor has started performance of the work, giving rise to the potential claim of additional compensation. In all other cases, such notice shall be given within ten (10) days after the happening of the event or occurrence, giving rise to the potential claim (See Subsection 104.04).

It is the intention of this Section that differences between the parties arising under and by virtue of the Contract shall be brought to the attention of the Engineer at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken.

109.05 - Force Account

Where it is specified herein, or agreed upon during the course of the work, that any portion of the construction shall be done by "Force Account," the Contractor shall keep an accurate record of all materials, labor, and equipment used thereon and shall furnish the Engineer a copy of each day's record within twenty-four (24) hours to permit an accurate check thereof. The City shall pay for such construction at the actual cost to the Contractor of such materials, and labor, including the cost of insurance, social security taxes, and bond chargeable to this portion of the work, plus fifteen (15) percent for superintendence, overhead, and the use of tools and appliances. The use of equipment on such construction shall be paid for at the rental rates recommended by the Association of General Contractors with such price and payment being full compensation for any and all costs in connection with the operation, repair, maintenance, overhead depreciation, profit, etc. for said equipment.

109.06 - Final Acceptance Estimate and Settlement

Upon due notice from the Contractor of presumptive completion of the entire project, the Engineer will make an inspection of the Project, and if all construction provided for and contemplated by the Contract is found completed to his satisfaction, that inspection shall constitute the Final Inspection and the Engineer will make the final acceptance and notify the Contractor in writing of his acceptance as of the date of the Final Inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same, and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the Final Inspection, provided the work has been satisfactorily completed. In such event, the Engineer will make the final acceptance and notify the Contractor in writing of his acceptance as of the date of Final Inspection.

Neither the making of a Final Inspection, the making of a final acceptance, nor the Engineer's written notification to the Contractor of such acceptance shall

constitute a waiver by the City of any latent defects in materials or the Work or of any defects not visible at the time of such inspection.

When the Final Inspection and Acceptance have been duly made by the Engineer as provided above, the Engineer will prepare the final estimate of the total quantities of the various classes of work performed as soon as the necessary measurements and computations can be made. Monthly estimates will be subject to correction in the final estimate.

The final estimate will be submitted to the Contractor for his approval and signature. The execution of the document setting forth the final estimate by the Contractor shall constitute full acceptance by him of the total amount shown as entire payment for the amount due him under the Contract, excepting the retained percentage and excepting pending claims under the Contract that the Contractor may have against the City. By executing the document setting forth the final estimate, the Contractor shall be estopped thereafter from filing any claim whatever under the Contract.

If the final estimate as submitted is not acceptable to the Contractor, he shall within a period of thirty (30) days after receipt of the final estimate file with the City a statement setting forth his claim for adjustments. Failure on the part of the Contractor to file such a statement within thirty (30) days after receipt of the final estimate shall constitute evidence of his agreement to the quantities set forth and he shall have no further claim under the Contract against the City.

After approval and execution by the Contractor, he will be paid the total amount earned less all previous payments and all other amounts retained or deducted under the provisions of the Contract. The retained percentage will be paid the Contractor as soon as all adjustments in the amount due are made by reason of final computations of the Contract quantities and upon approval of this final settlement by the City, however, that if any notice or notices of claim or claims for nonpayment of labor and materials for the prosecution of the work shall be filed with the City by any person before final settlement has been made, the City may at his option withhold out of the money due the Contractor an amount equal to such claim or claims until such time as the Contractor shall present full release or releases of such claim or claims to the City.

109.07 - General Cleanup

The Contractor shall be responsible for the general cleanup of the project site, such as smoothing and rounding of back slopes, leveling mounds, filling voids with appropriate material and removal of all excess material. Any material used to meet the requirements of this paragraph shall be considered incidental to the project and no additional compensation will be allowed.

109.08 - Final Guarantee

All materials and workmanship for which no specific specification is set forth in the Contract Documents shall be warranted by the Contractor to be of merchantable quality, free from defects, and fit for the particular purpose for which used for a period of one (1) year after the date of the Certificate of Substantial Completion signed by the City. The City may make any other claim for failure to perform the work or to provide materials in conformity with the Contract Documents, at any time within the limitations period provided by law.

If repairs or changes are required in connection with any work, as a result of the use of materials, equipment, or workmanship, which are inferior, defective, or not in accordance with the terms of the Contract, the Contractor shall promptly upon receipt of written notice from the City, and without expense to the City:

1. Place in satisfactory condition in ever particular all of such guaranteed work, correct all defects therein; and
2. Make good all damage to the building or site, or equipment or contents thereof, which in the opinion of the Engineer, is a result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the Contract; and
3. Make good any work or material, or the equipment and the contents of the building, structure, or site disturbed in fulfilling any such guarantee.

If the Contractor, after such notice, fails within ten (10) days to proceed to comply with the terms of this guarantee, the City may have the defects corrected and the Contractor and his Surety shall be liable for all cost and expenses incurred; provided, however, that in case of emergency where, in the opinion of the Engineer, delay would cause serious loss or damage, repairs may be made without notice being given to the Contractor and the Contractor shall pay the cost thereof.

**CITY OF IDAHO FALLS
PUBLIC WORKS DIVISION
ENGINEERING DEPARTMENT**

**STANDARD SPECIFICATIONS FOR
CONSTRUCTION**

2010 EDITION

STANDARD SPECIFICATIONS FOR CONSTRUCTION

SECTIONS 200, 300 & 400

200, 300, 400 - INTRODUCTION

These Specifications cover the furnishing of various materials, the placement thereof and other miscellaneous work items that may be required to complete the construction of public works facilities. All materials, workmanship and installation procedures shall be done in accordance with these Standard Specifications, the Plans and Special Provisions and as directed by the City Engineer. Any installation not conforming to the requirements shall be removed and replaced or repaired to the satisfaction of the City Engineer at the expense of the Contractor responsible for the work. No work will be considered for acceptance until such repair or replacement is accomplished.

Specification references made herein for manufactured materials and installation procedures shall refer to designations of the American Association of State Highway and Transportation Officials (AASHTO), American Society for Testing and Materials (ASTM), and Idaho Transportation Department - Division of Highways as referenced in the latest edition on the date of plan approval. It is not intended that materials listed herein be considered equal or generally interchangeable for all applications. The City Engineer shall determine which materials are suitable for the Project and shall specify those materials in the Plans and/or Special Provisions.

The Contractor shall immediately submit written notice to the City Engineer of changes in Site Condition, which may require a change in the materials and/or installation procedures than that specified. Additional compensation shall not be awarded for any extra work resulting from such changed conditions unless prior to performing such extra work the Contractor shall have submitted written notice of the changed conditions to the City Engineer and the City Engineer shall have given written authorization of the extra work. If such changed conditions are for the convenience of the Contractor's operations, all additional costs associated therewith shall be at the expense of the Contractor.

**CITY OF IDAHO FALLS
PUBLIC WORKS DIVISION
ENGINEERING DEPARTMENT**

**STANDARD SPECIFICATIONS
FOR
CONSTRUCTION
EARTHWORK AND BASES
SECTION 200**

2010 EDITION

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EARTHWORK AND BASES

SECTION 200

200 - SUBINTRODUCTION

Earthwork and Bases shall consist of all work required to construct or shape the earthen foundation, embankment, subgrade, bases, etc. of any street, alley, parking lot or other such facility in accordance with these Standard Specifications and in reasonably close conformity with the lines, grades and typical cross sections shown on the Plans or as established by the City Engineer. Earthwork and Bases shall consist of, but not be limited to, any or all of the following items.

- a. Clearing and Grubbing
- b. Removal of Trees, Stumps and Obstructions
- c. Obliteration of Old Streets and Roadways
- d. Excavation, Embankment, Subgrade Preparation and Compaction
- e. Haul
- f. Structure Excavation and Backfill
- g. Topsoil
- h. Aggregate Base Course
- i. Rolling

The classification of the work, construction method, methods of measurement and basis of payment shall conform to the detailed Specifications under the Section covering the items listed hereinafter.

Trees, shrubbery, buildings and any other facilities outside of the construction area shall be preserved and protected from damage and the Contractor will be held responsible for any damage thereto resulting from the construction operations. All trees, vegetation and ground cover not within the immediate construction area, including median areas, landscaped areas, etc. shall be preserved and protected.

201 - MATERIALS

201.01 - Geotextile Fabric

The geotextile shall meet the most recent requirements of AASHTO M 288 with Class 2 survivability. No slit film and/or heat rolled geotextiles shall be allowed. The geotextile type (Subgrade Separation, Drainage, Erosion Control) shall be specified in the Plans and / or Special Provisions.

During periods of shipment and storage, the geotextile shall be placed in a dry area off the ground and protected from damage and it shall also be kept in an opaque, heavy-duty protective covering.

Sewn seams may be used in lieu of overlaps and shall meet the most recent requirements of AASHTO M 288.

Certification - The Contractor shall furnish the geotextile manufacturer's certified test results attesting that the geotextile meets the requirements stated in these Specifications. The certification shall include the following information about each geotextile to be used.

Manufacturer's name and current address,

Full product name,

Style, merge, or product code number,

Geotextile roll number,

Geotextile polymer type,

Proposed geotextile use(s), and

Certified test results.

The certification shall give the name and address of the testing agency and the date of tests, and shall set forth the means of identification, including lot number, which will permit field determination of the product delivered to the project as being the product covered by the certification.

All geotextile property requirements stated herein are minimum average roll values. The tensile strengths shall be determined in both machine and cross-machine directions.

201.02 - Borrow

Borrow shall be obtained from sources designated and / or approved in writing by the City Engineer.

201.03 - Granular Borrow

Granular Borrow shall consist of gravel. The material shall have a maximum size of six (6) inches, contain no more than ten (10) percent passing the number two hundred (200) sieve, and have a sand equivalent value greater than thirty (30). The sand equivalent test shall be performed in accordance with AASHTO T 176.

201.04 - Topsoil

The City Engineer shall determine the suitability of topsoil prior to use. Topsoil shall be transported from the source to its final position unless stockpiling is specified. Topsoil shall be from a source selected by the Contractor and in compliance with the requirements specified herein. The City Engineer may make such inspections and perform such tests as deemed necessary to determine that the material meets the requirements.

At least seven (7) days before its use, the proposed source of topsoil shall be submitted to the City Engineer for approval. The Contractor shall submit a written request for approval, which shall be accompanied by a written report of an approved materials testing firm, which states that the proposed source complies with these Specifications.

Topsoil shall be a uniform friable sandy loam, free of roots, clods and stones larger than one (1) inch in greatest dimension, pockets of coarse sand, noxious weeds, sticks, brush, and other litter. It shall not be infested with nematodes or other undesirable insects and plant disease organisms.

Topsoil shall meet the following requirements:

Gradation Limits: Sand fifty to eighty (50-80) percent, clay twenty (20) percent maximum, and silt thirty (30) percent maximum. The sand, clay and silt gradation limits shall be as defined in ASTM D 422.

Permeability Rate: Not less than one-half (1/2) inches nor more than two (2) inches per hour when tested in accordance with ASTM D 2434.

Agricultural Suitability: The topsoil shall be suitable to sustain the growth of the plants specified.

201.05 - Aggregate Base

Aggregate Bases delivered to the job site shall meet the following requirements:

Sieve Sizes	Percent Passing
1-Inch	100
3/4-Inch	90-100
No. 4	40-65
No. 8	30-50
No. 200	3-9

The sand equivalent shall not be less than thirty (30) if five (5) percent or more of the material passes the number two hundred (No. 200) sieve. Sand equivalent will not be required if less than five (5) percent passes the number two hundred (No. 200) sieve.

The aggregate portion retained on the number four (4) screen shall have at least fifty (50) percent by weight of particles with two (2) or more fractured faces.

If lime or cement filler is added, the gradation tables shall still apply including the percent of lime or cement filler as indicated on the Plans or in the Special Provisions.

201.06 - Structure Backfill

Unless otherwise noted in the Plans or other Contract documents structure backfill shall consist of granular borrow as specified in this Subsection.

202 - EQUIPMENT

202.01 - Rollers

Rollers shall be in good condition, capable of reversing without backlash, and shall be operated at speeds slow enough to avoid excessive displacement of the material being compacted. The number and compactive force of rollers shall be sufficient to compact materials as specified. The use of equipment that results in excessive crushing of the aggregate will not be permitted. The Contractor shall not use rollers producing pickup, washboard, and uneven compaction of the surface or other undesirable results.

202.01.1 - Steel Rollers

Steel rollers shall consist of three (3) - wheel or tandem type self-propelled rollers equipped with cleaning devices to prevent adhesion of material to the wheels. Steel-wheel rollers for use on base material and reconditioning shall have a minimum weight of ten (10) tons and a minimum compression of three hundred twenty-five (325) pounds per inch of width for the rear wheels or drum. The maximum rate of travel shall be four (4) miles per hour.

202.01.2 - Pneumatic-Tire Rollers

Wherever required and permitted by specifications, self-propelled rollers with adequate power to perform the required compaction shall be furnished. Pneumatic-Tire Rollers for compacting base courses shall meet the requirements of Groups No. two, three or four (2, 3 or 4) as follows:

Group Number	Tire Pressure in PSI	Load Per Wheel in lbs.
2	100	3,000
3	100	4,500
4	100	8,500

Pneumatic-tire rollers shall be equipped with smooth compactor tires. The use of wobble-wheel rollers whose tires revolve in a plane, which is not at right angles to the axle shaft, will not be permitted. The air pressure in any tire shall not vary more than five (5) pounds from the pressure established. The rollers shall be operated at speeds between three and eight (3-8) miles per hour unless otherwise provided or directed.

202.01.3 - Vibratory Rollers

Wherever required and permitted by the specifications, the Contractor shall furnish vibratory rollers, which are adequately designed and powered to

perform the required compaction. They shall be of sufficient size and number to keep up with roadway production while providing the required density.

Vibratory rollers used on Rock Fills shall have a minimum rated dynamic force of thirty thousand (30,000) pounds per impact and at least one thousand (1,000) vibrations per minute.

Vibratory rollers for use on rock embankments, granular borrow and bases shall be operated at high amplitude unless otherwise directed. Self-propelled or towed units will be acceptable.

202.01.4 - Miscellaneous Rollers

Other types of rollers, specifically designed and manufactured for use on granular borrow, rock embankments, small areas of base and other special applications, shall be approved by the City Engineer, provided satisfactory compaction is obtained. Grid rollers, vibratory pan compactors, tamping rollers and various special compactors will be classed as miscellaneous rollers.

Grid rollers for use on Rock Fills shall have a static weight of at least ten (10) tons and four thousand (4,000) pounds per foot of drum width.

204 - TESTING

204.01 - Density Determination

The standard density shall be determined in accordance with the following applicable standard methods:

Moisture-Density Relations of Soils Using a 5.5-Pound Rammer and a 12-inch Drop	AASHTO T 99 Method A or C
Compaction Standard for Coarse Granular Materials by Use of the Vibratory Spring-Load Compactor	Idaho T-74

The standard density of coarse granular material shall be determined in accordance with the following standard method:

Moisture-Density Relations of Soils Using a 10-Pound Rammer and an 18-inch Drop	AASHTO T 180 Method D
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Determination of in-place density and percent compaction of standard density shall be by the following standard method:

In Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)	AASHTO T 310
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A block of concrete weighing a minimum of seventy-five (75) pounds and well seated on a compacted base may be substituted for compaction base specified in AASHTO T 99.

204.02 - Minimum Density

1. For materials having a maximum dry weight of one hundred twenty (120) pounds per cubic foot or less, minimum density shall be ninety five (95) percent of standard density.
2. For materials having a maximum dry weight greater than one hundred twenty (120) pounds per cubic foot, minimum density shall be one hundred (100) percent of standard density.
3. In between back of curbs within street construction, all material one (1) foot beneath finished grade shall be compacted to one hundred (100) percent of standard density.

205 - CONSTRUCTION

Utilities of record will be shown on the Construction Plans insofar as it is possible to do so. Failure of the City to show the existence of subsurface objects or installations on the Plans shall not relieve the Contractor from his responsibility to make an independent field check for such facilities on the ground at the project site nor shall it relieve him from any liability for damages resulting from his operations unless otherwise provided in the Special Provisions or by the exception hereinafter described.

It shall be the responsibility of the Contractor to give proper written notification to any agencies that may have utilities or other facilities within the project area and to cooperate with these agencies in the protection and/or relocation of these various underground and/or above ground facilities. These agencies will give assistance to the Contractor in the location of their various facilities, but this assistance shall not relieve the Contractor from his responsibility for any damage incurred by said utilities or facilities, except in the case where said installations are not located adequately or properly by the utility company, agency or department concerned. In such cases, the Contractor will not be held liable for damage to said facilities if he has proceeded with all due caution, diligence and direction in his efforts to avoid damage to said facilities.

All construction activities within the City of Idaho Falls that will disturb 1 acre of ground or more or is part of a larger common development that will disturb more than one acre shall require the Contractor to seek coverage under the Construction General Permit (CGP) by filing a Notice of Intent with the EPA to discharge storm water. The Contractor shall also be required to create and implement a Storm Water Pollution Prevention Plan (SWPPP). Additional information regarding both SWPPP's and CGP can be obtained at the current EPA website for Region 10.

205.01 - Clearing and Grubbing

Clearing and grubbing shall consist of removing all natural and artificial objectionable materials hereinafter described from the street or alley right-of-way, easements or construction areas, street or alley approaches, material sites within the right-of-way, parking lot construction areas, areas through which ditches and channels are to be excavated and such other areas as may be specified in the Plans and/or the Special Provisions.

All clearing and grubbing work shall be performed sufficiently in advance of construction operations so as to permit a well-planned schedule of work. Clearing and grubbing shall cover all areas within the limits of the construction zone or as called for in the Plans or Special Provisions. No payment will be made to the Contractor for clearing and grubbing outside the stated limits unless the City Engineer authorizes such work in advance in writing.

205.01.1 - Removal of Objectionable Materials

The natural ground surface shall be cleared of all vegetation such as trees, logs, and upturned stumps, roots of downed trees, brush, grass, weeds and all other objectionable material within the limits of construction. Within the limits of the clearing and grubbing zone, all stump roots one and one-half (1-1/2) inches in diameter or larger, buried logs and all other such objectionable material shall be removed down to a point two (2) feet below the existing ground surface or street subgrade, whichever is deeper.

205.01.2 - Disposal of Materials

No debris of any kind shall be deposited in any stream, body of water, street or alley. Debris shall be deposited upon private property only with the prior written consent of the owner, and a copy of such consent shall be presented to the City. The refuse resulting from the clearing and grubbing operations shall be hauled to a waste site provided by the Contractor and shall be disposed of in such a manner as to meet all requirements of Federal, State, County and Municipal regulations regarding health, safety and public welfare. In no case shall any material be left on the project, shoved onto abutting private properties or be buried in embankments or trenches within the project area.

205.01.3 - Protection of Retained Improvements

Where ornamental trees exist in planting areas and are not to be removed, it shall be the Contractor's responsibility to trim low limbs, which may interfere with the normal operation of his equipment. The trimming shall be performed in a professional manner by competent personnel prior to his machine operations in such a manner as the City Engineer may approve. No separate payment will be made for this work. It shall be considered incidental to other pay items.

Trees, shrubbery, flower beds, etc. designated for retention and protection shall be left in place and the Contractor shall take care not to damage or injure such trees, shrubbery or flowers by any of his operations. Trees and plants that are not to be removed shall be fully protected from injury by the Contractor at his expense. Trees shall be removed in such a manner as not to injure standing trees, plants or any other improvements that are to be preserved. Existing improvements, adjacent property, utilities and other such facilities, shall be protected from injury or damage resulting from the Contractor's operations.

205.01.4 - Removal and Replacement of Fences

All fences adjoining any excavation or embankment that may be damaged or buried shall be carefully removed and placed on the adjoining property until they are to be replaced. The fencing shall be replaced in as good a condition as it was originally.

205.02 - Selective Removal of Trees or Stumps

When the removal and disposal of designated trees, including their stumps, and designated stumps and are not within the limits of an area designated for clearing and grubbing, these items shall be removed in accordance with the above requirements. The Contractor shall be responsible for the protection of all other improvements surrounding said items.

205.03 - Removal of Obstructions

This work shall consist of the removal, wholly or in part, and satisfactory disposal of all buildings, fences, structures, old pavements, sidewalks, curbs and gutters, abandoned pipelines and any other obstructions as designated, any portions of which are in the right-of-way. This work does not include removal of utilities, which are to be retained and protected, and for those obstructions to be removed, replaced, relocated or otherwise disposed of under other items in the Contract. It shall also include the salvaging of designated materials and backfilling the resulting trenches, holes, and pits. All designated salvageable material shall be removed, without unnecessary damage, in sections or pieces, which may be readily transported and shall be stored by the Contractor at specified places within the project limits or as otherwise directed by the City Engineer. Unusable material may be disposed of outside the limits of view from the project with prior written permission of the property owner on whose property the material is placed. Unusable material shall be disposed of in such a manner that no unsightly appearance will result. Copies of all arrangements with property owners are to be furnished to the City Engineer.

All asphalt, concrete and masonry so removed shall be disposed of in accordance with the requirements in the Section general conditions of the Standard Specifications.

205.03.1 - Removal of Foundations

Demolition of buildings and structures other than foundations or slabs shall be as specified in the Special Provisions or as shown on the Plans. Foundation or basement walls, piling, butts of utility poles, etc. shall be removed to a minimum depth of two (2) feet below subgrade or two (2) feet below original ground, whichever is lower. Slabs or basement floors shall be sufficiently broken up so as to provide for the free passage of water and to prevent its entrapment. Basements or cavities left by structure removal shall be filled to the level of the surrounding ground with backfill material approved in writing by the City Engineer and, if it is within the prism of construction said backfill material shall be compacted to the minimum density requirements for the material as specified in the Section on TESTING.

205.03.2 - Removal of Bridges, Culverts and Other Drainage Structures

Bridges, culverts and other drainage structures being used by traffic shall not be removed until satisfactory arrangements have been made to accommodate said traffic usage. 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 (1) foot below natural ground surface. Where such portions of existing structures lie wholly or in part within the limits for a new structure, they shall be removed as necessary to accommodate the construction of the proposed structure. Unless otherwise provided, salvageable materials, steel superstructures, etc., will become the property of the Contractor and shall be removed from the site of the work or otherwise satisfactorily disposed of.

205.03.3 - Removal of Asphalt Pavement

Asphalt pavement shall be removed to clean, straight lines with vertical faces. Saw cutting of the edges to be joined shall be required. Wheel cutting or other pavement cutting methods shall only be used prior to final saw cutting and located approximately one (1) foot inside the final saw cut location. Where asphalt pavement adjoins the end of an existing street, a trench or other such areas to be patched or joined, the pavement edges adjacent to those areas shall have a final saw cut to neat, straight lines with vertical faces before adjacent pavement is placed.

205.03.4 - Removal of Concrete Pavement, Sidewalks, Curbs and Gutters

Whenever it is necessary to remove any existing concrete sidewalk, pavement, curb and gutter, etc. along a line or at a location other than an existing joint, an approved concrete saw shall be used to cut the concrete along the so established line. Sawing shall be done in a neat, straight line and shall be to a depth of at least one and one-half (1-1/2) inches. The remaining thickness of the concrete member may be broken or chipped away, using particular care not to break the concrete on the backside of the sawed joint. Where, through negligence, the Contractor chips or breaks the concrete section, behind either the newly sawed joint or an existing adjacent joint, he shall replace such damaged section at his own expense.

205.04 - Obliteration of Old Street and Roadway

This work shall consist of obliterating such portions of abandoned street or roadway as are indicated on the Plans or as directed. When the old street or roadways to be obliterated are no longer required for traffic, the roadbed shall be scarified, harrowed and bladed. The roadway shall then be regraded to produce an appearance similar to adjacent topography. All structures designated on the

Plans, for the removal of which a price is not included in the Contract, shall be broken down, buried or removed.

205.04.1 - Class I Obliteration

This class of obliteration shall be accomplished where it is desired to erase the scars of former construction and to promote the growth of natural vegetation over the street or roadway. This shall be accomplished by scarifying, harrowing and blading the roadbed only, in accordance with the applicable general requirements hereinbefore set forth. This type of work shall only be done in areas located outside of "new" street or roadway.

205.04.2 - Class II Obliteration

This class of obliteration shall be accomplished in accordance with the requirements outlined for Class 1 Obliteration. In addition, the ditches shall be filled and the entire roadway rough graded followed by scarifying, harrowing and blading so that the old road will present a pleasing appearance with slopes rounded and flattened to blend naturally with the adjacent topography. This type of work shall only be done in areas located outside of "new" street or roadway.

205.05 - Excavation of Roadways

This work shall consist of excavating and grading the roadway, side street, alley and driveway approaches, alleys, sidewalk areas, planting areas, parking lots, storm water detention ponds etc. and all other such work as may be necessary for the completion of the excavation, slopes, roadway ditches, side street approaches, sidewalk areas, planting areas, alleys and subsidiary work including the disposal of all surplus or unsuitable material. This work shall include the removal and disposal of structures or any miscellaneous obstructions, which are visible or are indicated on the Plans which encroach upon or otherwise obstruct the work and for which a separate bid item is not provided.

All underground work contemplated in the area shall be completed and properly backfilled before any work under this Section is started. This is intended to include work under the Contract, work to be performed by the City or work to be performed by others. The Contractor shall exercise the necessary caution to prevent debris from falling into manholes, inlet boxes, water valves, etc. Any debris that falls into any existing structure shall be immediately removed. The Contractor shall take all necessary precautions to prevent damage to any manholes, manhole rings and covers, water valve boxes, inlet boxes or any other facilities and any damage done thereto shall be corrected as directed by the City Engineer.

All work shall be performed in accordance with the alignment, grades, cross sections, etc. shown on the construction Plans or as established by the City Engineer. The Contractor shall not proceed beyond the dimensions and

elevations established by the City Engineer, and no material shall be moved prior to the staking out and cross sectioning of the site.

205.05.1 - Roadway Excavation

Roadway Excavation shall be any and all material of whatsoever nature, character or type that may be encountered within the project area. Unless there is a specific item in the Contract for ROCK EXCAVATION, it shall be considered ROADWAY EXCAVATION and included in this item for measurement and payment. Material that is found to be unsuitable for the planned or intended use shall be excavated and disposed of as directed by the City Engineer. The removal and disposal of such unsuitable material shall be considered as ROADWAY EXCAVATION for the quantities involved irrespective of whether the removal and disposal of such material is shown or not shown on the Plans and/or is specified or not specified in the Special Provisions.

205.05.2 - Rock Excavation

Rock Excavation shall include all solid rock in ledges, bedded deposits and unstratified masses and conglomerate deposits so firmly cemented as to present all the characteristics of solid rock and which cannot be removed without drilling and blasting and all boulders containing a volume of more than one (1) cubic yard. All solid rock layers interspersed with strata of clay or similar material will be classified as Rock Excavation for the total depth of excavation in which the solid rock strata constitutes not less than eighty-five (85) percent of the total depth.

205.05.3 - Subgrade Preparation

The subgrade will be the natural earthen surface of the roadbed or that surface as noted as "Subgrade" on the typical section or that surface that will be staked as "Subgrade" for line and grade by the City Engineer. In advance of setting line and grade stakes, the subgrade area shall be prepared in accordance with the Section on CLEARING AND GRUBBING. All depressions or ruts, which contain water, shall be properly graded to drain. The subgrade shall be excavated and bladed to remove all uneven areas and to secure a uniform surface true to the required line and grade. The subgrade material shall then be scarified to a depth of eight (8) inches, adjusted to within plus or minus two (2) percent of optimum moisture content and compacted to the minimum density requirements of the material as specified in the Section on TESTING. Grade and line throughout the various stages of constructing the subgrade shall be secured from the reference stakes. The subgrade shall be maintained in the finished condition until the first course of surfacing is placed upon it.

No additional compensation will be made for any work required to accomplish the intent of this section except for payment at the Unit Contract Prices for furnishing and compacting such additional material of the type ordered

by the City Engineer that may be necessary to bring the subgrade to the required line, grade and cross section.

205.05.4 - Excavation of Unsuitable Material below Subgrade

If subgrade soils are too soft and wet to support equipment during stripping operation or placement of base course layers, or become rutted, pumped, or otherwise disturbed, they shall be removed and replaced with granular borrow material as directed by the City Engineer. Only light track mounted equipment shall be used to excavate soft subgrade soils. Over-excavation shall continue until firmer soil capable of supporting the equipment is encountered, or for a depth of eighteen (18) inches below subgrade, or as directed by the City Engineer. Compaction of natural soils in the bottom of subexcavated areas is not required.

If soils are still soft at a depth of eighteen (18) inches below subgrade elevation, a GEOTEXTILE FABRIC shall be placed in the excavated area as directed by the City Engineer. The granular borrow shall be placed in a single lift by end dumping and pushing ahead of the equipment so that machinery does not operate directly on the fabric. If the City Engineer requests, the top six (6) inches of the subbase shall be compacted to the minimum density requirements for the material as specified in the Section on TESTING. Repaired areas shall not be subjected to heavy traffic until paved. If such areas are caused by negligence of the Contractor in his operations, the Contractor at his own expense shall do the removal, replacement and compaction.

205.05.5 - Geotextile Fabric

When a geotextile fabric is required, it shall be installed in accordance with these Specifications and in reasonably close conformity with the lines and grades or as directed by the City Engineer. The geotextile fabric shall be placed along the entire bottom and sides of the excavation with a minimum of eighteen (18) inches overlap at the top edge as shown on the Plans or as directed by the City Engineer. All splices of the fabric shall be sewn in accordance with AASHTO M-288 or overlapped a minimum of eighteen (18) inches.

205.05.6 - Process Old Street or Roadway

When the old street or roadway surfacing is less than two (2) feet below the proposed finished grade, it shall be processed by scarifying full depth and spreading to form a uniform foundation. This type of work shall only be done in areas located within the "new" street or roadway.

205.05.7 - Overbreak

Overbreak is that portion of any such material which is excavated, displaced or loosened outside of and beyond the slope lines or grades as staked or reestablished, regardless of whether any such overbreak is due to blasting, to

the inherent character of any formation encountered or to any other cause. All overbreak so defined shall be removed by the Contractor at his own expense and shall be disposed of by the Contractor in the same manner as that provided for surplus materials, but at his own expense and without any allowance for haul.

Whenever it is agreed to in writing and in advance between the Contractor and the City Engineer, overbreak may be used as a replacement for borrow material, which is scheduled for use in embankment areas. In this event, payment will be made for the volume of borrow which the overbreak replaces at the respective Contract price per cubic yard for such borrow, provided however, that no allowance will be made for overbreak which is placed in the embankment as planned in lieu of available material coming from within the neat lines of the roadway prism.

205.06 - Compaction

Compaction of backfill material and embankments (including sidewalk and curb and gutter backfill and embankment) and embankment foundations shall meet the following requirements. Class "A" Compaction shall be required unless one of the other classes is shown on the Plans or called for in the Special Provisions. Embankments constructed of material too granular to test by the methods outlined in the Section on TESTING shall be constructed in accordance with the requirements of the Section on CONSTRUCTION OF ROCK FILLS.

205.06.1 - Class "A" Compaction

Class "A" Compaction shall consist of compacting the top twelve (12) inches of excavations and all embankment and backfill materials within the roadway prism to the minimum density required for the material as specified in the Section on TESTING.

205.06.2 - Class "B" Compaction

Class "B" Compaction shall consist of compacting the top twelve (12) inches of embankment and backfill material below the subgrade to the minimum density required for the material as specified in the Section on TESTING. Other material below subgrade shall be compacted by routing all construction equipment uniformly over the entire surface of each layer. Additional rolling may be directed if routing of equipment is unsatisfactorily performed.

205.06.3 - Class "C" Compaction

Class "C" Compaction shall consist of compacting the top eight (8) inches for selected areas under embankments to the minimum density required for the material as specified in the Section on TESTING. The area limits shall be between subgrade shoulders and as shown on the Plans or as directed by the City Engineer.

205.06.4 - Class "D" Compaction

Class "D" Compaction shall consist of compacting areas designated in the Plans and/or the Special Provisions, the median embankments, and slope flattening. The embankment shall be placed in lifts not to exceed twelve (12) inches in depth of material before compaction. The fill material must be moist. The compaction shall consist of not less than three (3) complete coverages with approved track-type or rubber tire earthmoving equipment.

205.07 - Haul

The "Free Haul" distance of excavated material and borrow shall be a distance of three thousand two hundred eighty (3,280) feet. The Contractor will not be allowed to waste material and then use borrow material in lieu of hauling the material as required. No allowance will be made for cross haul of material unless specifically ordered by the City Engineer.

205.08 - Disposal of Excess Material

Material shall not be wasted without the prior written permission of the City Engineer. The excavation and borrow operations shall be so scheduled that no unauthorized waste of excavation will result. Quantities of materials, as shown on the Plans, in the Contract or in the Special Provisions, are approximate only. The Contractor shall satisfy himself that there is sufficient material available for the completion of the fills or embankments before disposing of any indicated surplus material inside or outside the right-of-way or project limits. Any shortage of material which is caused by the Contractor prematurely disposing of any indicated surplus materials shall be replaced by him, and no compensation will be allowed for such replacement.

205.09 - Embankments for Roadways

This work shall consist of grading and compacting the embankment for the roadway, side street, alley and driveway approaches, alleys, sidewalk areas, planting areas, parking lots, etc. and all other such work as may be necessary for the completion of the embankments, slopes, roadway ditches, side street approaches, sidewalk areas, planting areas, alleys and subsidiary work including the disposal of all surplus or unsuitable material. This work shall include the removal and disposal of structures or any miscellaneous obstructions, which are visible or are indicated on the Plans, which encroach upon or otherwise obstruct the work and for which a separate bid item is not provided.

All work shall be performed in accordance with the alignment, grades, cross sections, etc. shown on the construction Plans or as established by the City Engineer. The Contractor shall not proceed beyond the dimensions and elevations established by the City Engineer, and no material shall be moved prior to the staking out and cross sectioning of the site.

No embankment material shall be placed until the City Engineer has approved the foundation. Embankment, except hereinafter provided, shall be placed in layers not exceeding eight (8) inches in loose thickness. Each layer shall be uniformly compacted at approved uniform moisture content to the minimum density requirements for the material as specified in the Section on TESTING, unless otherwise shown on the Plans or specified in the Special Provisions.

Across subgrade soils that will not support conventional construction and hauling equipment, the lower part of the embankment may be constructed by end dumping granular material on an approved geotextile to form a uniform layer of a thickness not greater than that necessary to support the hauling equipment. The remainder of the embankment shall be constructed in layers as specified.

Embankment material consisting of gravel or rock, which cannot be incorporated in eight (8) inch layers, shall be placed in layers of such thickness as directed. Embankment material which cannot be tested using the criteria in TESTING shall be constructed in accordance with the Section on CONSTRUCTION OF ROCK FILLS. Where embankments are to be made of material from rock cuts or other material, which is unsuitable for finishing the roadbed, a leveling course shall be constructed of other approved granular material.

205.09.1 - Unsuitable Material

The City Engineer may designate as unsuitable those materials that cannot be properly compacted in embankments. All such unsuitable material shall be disposed of as directed. If embankment material found to be unsatisfactory for the specified or intended use on the project solely because of high moisture content, the Contractor may be directed by the City Engineer to process the material to reduce the moisture content to a more optimum condition so that the material can be utilized within the project in the intended manner or to remove the material and replace it with suitable backfill material. The street, alley or other such project facility shall be maintained in such condition that it will be well drained at all times.

205.09.2 - Construction of Rock Fills

The rock fill materials shall be placed in horizontal layers no thicker than eighteen (18) inches unless the largest rock is greater than eighteen (18) inches. No layer shall be thicker than three (3) feet, unless otherwise permitted. Large rock shall be distributed so the voids between them are filled with smaller rock and/or granular material. Adequate water to facilitate compaction and minimize dust shall be provided.

Each layer placed more than eighteen (18) inches below subgrade shall be uniformly compacted with a minimum of three (3) full coverages for each six

(6) inches of lift thickness or fraction thereof with rollers meeting the requirements of the Section on EQUIPMENT. Rolling requirements may be reduced one coverage per six (6) inches, or fraction thereof, for each increase of five thousand (5,000) pounds per impact for vibration rollers or one thousand (1,000) pounds per foot of drum width for grid rollers. In no case will less than one complete coverage for each six (6) inches of lift thickness be allowed.

Rock material placed within eighteen (18) inches of subgrade and rock backfill of over excavated areas in rock cuts shall be constructed in layers not exceeding nine (9) inches thick, unless directed otherwise. Each layer shall be uniformly compacted with a minimum of twelve (12) full coverages of a vibratory roller meeting the requirements of the Section on EQUIPMENT. Vibratory rolling may be reduced one full coverage for each increase of five thousand (5,000) pounds per impact above the minimum. In no case will less than six (6) full coverages per nine (9) inch lifts, or fraction thereof, be allowed.

The Contractor shall limit the speed of a grid roller to no more than four (4) miles per hour and the speed of a vibratory roller to no more than one-point-five (1.5) miles per hour.

205.09.3 - Topsoil

Topsoil excavated from the roadway shall be placed directly upon cut and fill slopes without use of stockpiles whenever conditions and the progress of construction will permit. Where this procedure is not possible, topsoil shall be excavated and stockpiled along the project at designated locations.

Topsoil shall not be placed in its final position until the areas to be covered have been properly prepared and grading operations in the area have been substantially completed. Topsoil shall be placed and spread at locations and to thickness requirements as shown on the Plans and shall be keyed to the underlying material by the use of harrows, rollers or other equipment suitable for the purpose.

206 - AGGREGATE BASES

Unless otherwise called out on the Plans or in the Special Provisions, the Contractor shall be responsible for providing the source of all aggregate and for securing the necessary variances to County zoning regulations as may be required to allow the operation of gravel crushing equipment at the aggregate source site. This shall include any required dust collector system, wet-wash system, etc. on the gravel crushing plant that may be required to meet County, State or Federal zoning and air pollution requirements.

All work involved in clearing and stripping any aggregate sources, including the handling of any unsuitable material encountered, shall be performed by the Contractor and no additional compensation will be allowed for this work. In case the material deposit contains sand or other material, in excess of the specification gradation requirements or of an unacceptable quality, such excess or undesirable material shall be removed and disposed of prior to crushing.

206.01 - Placing

Aggregate bases shall be delivered to the roadbed as uniform mixtures and each layer shall be spread in one (1) operation. Segregation shall be avoided and base shall be free from pockets of coarse or fine material.

Aggregate bases shall be deposited on the roadbed at a uniform quantity per linear foot which quantity shall provide the required compacted thickness within the tolerances specified herein without resorting to spotting, picking up or otherwise shifting the aggregate base material. At the time aggregate base is spread, it shall have moisture content sufficient to prevent segregation. Such moisture shall be uniformly distributed throughout the material.

Where the required thickness is six (6) inches or less, the base material may be spread and compacted in one (1) layer. Where the required thickness is more than six (6) inches, the base material shall be spread and compacted in two (2) or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed six (6) inches. Each layer shall be spread and compacted in a similar manner. When vibrating or other approved types of special compacting equipment are used, the compacted depth of a single layer of the base material may be increased to eight (8) inches upon approval of the City Engineer.

206.02 - Mixing

Unless otherwise specified, the Contractor shall mix the base material by one (1) or a combination of the three (3) methods specified below.

1. Stationary Plant Method: The aggregate and water shall be mixed in an approved mixer. Water shall be added during the mixing operation in an amount necessary to facilitate compaction. After mixing, the base material shall be placed on the roadbed by means of an approved aggregate spreader.
2. Travel Plant Method: After the material for each layer of base 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 in an amount necessary to facilitate compaction.
3. Road Mix Method: After material for each layer of base course has been placed, the materials shall be mixed by motor graders or other approved equipment until the mixture is uniform throughout. During the mixing, water shall be added in an amount necessary to facilitate compaction.

206.03 - Shaping and Compacting

After each layer has been spread, it shall be compacted for its full width. Compaction shall continue until not less than one hundred (100) percent of the standard density is attained. The standard and minimum density shall be determined in accordance with the Section on TESTING.

Rollers shall be operated along lines parallel to and concentric with the centerline of the roadway or other area being constructed and no material variation there from will be permitted. Rolling shall start longitudinally at the sides and proceed towards the center, overlapping on succeeding trips by at least one-half (1/2) of the width of the roller unit. On super-elevated curves, rolling shall begin at the low side and progress towards the high side. The rollers, unless otherwise directed, shall operate at a speed between three to five (3-5) miles per hour. All rollers must be maintained in good mechanical condition.

The surface of each layer of the base material shall be maintained during the compaction operations in such a manner that a uniform texture is produced and the aggregates are firmly keyed. The moisture content of the base material shall be adjusted to plus or minus two (2) percent of optimum prior to compaction.

Aggregate Base material which does not conform to the aforementioned requirements shall be reshaped or reworked, watered and thoroughly recompacted in conformance to the specified requirements. The cost of this work shall be born solely by the Contractor.

The Contractor shall subcontract with an approved testing firm to perform compaction, gradation and sand equivalency testing on aggregate base. The

testing firm shall perform compaction testing in accordance with the Standard Specifications.

A minimum of one (1) test per one-hundred (100) feet of the roadway width shall be performed at random locations on the finished aggregate base.

Gradation and sand equivalency testing shall be conducted at least once every two thousand (2000) tons of aggregate base material placed. A minimum of one test is required for quantities smaller than two thousand (2000) tons.

The testing firm shall perform any additional testing they deem necessary to certify that the aggregate base has been compacted in accordance with City Standards. Test results shall be submitted to the City Engineer a maximum of one day after the compaction work and subsequent testing has been completed.

207 - STRUCTURE EXCAVATION AND STRUCTURE BACKFILL

Structure excavation shall include the work of excavation and disposal of all materials required for the construction of structures and unless otherwise specified shall include all necessary drainage, pumping, bailing, sheeting, shoring, the construction of cribs and cofferdams and their subsequent removal and removing old structures or parts thereof as required.

Structure backfill shall include the work of furnishing, placing and compacting backfill material, sloping and cleaning up the sites.

207.01 - Excavation Schedules

All structure excavation shall be considered unscheduled unless specific bid items are provided for in the Contract.

207.01.1 - Structure Excavation Schedule No. 1

Structure Excavation Schedule No. 1 shall include excavation for bridges and box culverts.

207.01.2 - Structure Excavation Schedule No. 2

Structure Excavation Schedule No. 2 shall include excavation for all other structures.

207.02 - Excavation

Trenches shall be sheeted and braced if necessary. Such sheeting shall not be removed until backfill has progressed to such a stage that no damage to pipe lines or structures will result from its removal. Unless otherwise indicated in the Plans or directed, the Contractor shall remove all sheeting and bracing utilized in structure excavation.

Unstable foundation material shall be removed as directed below the designed elevation. Suitable surplus excavated material shall be used in the construction of embankments and unsuitable material shall be wasted. Material removed below designed elevation shall be replaced with approved material.

Where rock, hardpan or other unyielding material is encountered, it shall be removed below the designed grade and backfilled as directed. Solid rock excavation below the established footing elevation shall be filled with Class 2 Concrete for bridge and box culvert foundations.

Where the footing is to rest on material other than rock or boulders, special care shall be taken not to destroy existing bearing capacity. Disturbed

material shall be removed from the excavation and the footing excavation backfilled to the Plan elevation with approved material. No structure shall be placed until the City Engineer has approved the foundation.

207.03 - Backfill

Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of any portion of the concrete materials being carried away. No pumping will be permitted during the placing of concrete or for a period of at least twenty-four (24) hours thereafter, unless it is done from a suitable sump or well point separated from the concrete work. No backfill shall be placed against newly constructed masonry or concrete structures for a period of fourteen (14) days unless authorized.

Backfill placed through water around abutments, wing walls and piers shall consist of suitable material placed in layers. Compaction of the backfill shall be as shown on the Plans. Backfill placed in areas not within the roadway prism or special backfill placed around pipe underdrains and not requiring a higher degree of compaction for some other purpose may be compacted to approximately the same density as the adjacent undisturbed soil or gravel. Compaction may be obtained by any effective means the Contractor may choose. All other backfill shall consist of suitable materials uniformly distributed in layers of not more than eight (8) inches and compacted to the minimum density required for the material as specified in the Section on TESTING before successive layers are placed.

209 - MEASUREMENT AND PAYMENT

209.01 - Clearing and Grubbing

209.01.1 - Measurement

Clearing and Grubbing shall be measured on either an ACRE or LUMP SUM basis. ACRE basis shall be measured by the stakes set by the City Engineer and shall be calculated on the coordinate basis using arc measurement for curves. LUMP SUM basis shall include all work to be done within the Project limits.

209.01.2 - Payment

Clearing and Grubbing shall be paid at the Contract unit price bid on either an ACRE or LUMP SUM basis. The payment shall be considered as full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved in Clearing and Grubbing areas as shown on the Plans, as specified in these Specifications, the Special Provisions or as may be directed by the City Engineer and shall include all costs associated with the removal and disposal of all the resulting materials.

When the Contract does not include an item for Clearing and Grubbing, this work shall be considered as subsidiary work and the cost thereof shall be included in the Contract unit prices for other earthwork items.

209.02 - Selective Removal of Tree or Stump

209.02.1 - Measurement

Selective Removal of Tree, including its stump, and Selective Removal of Stump shall be measured on a PER EACH basis for the diameters specified in the Contract Documents. Diameters shall be rounded down to the nearest diameter for which a unit price is established. Measurement for tree will be made at a point two (2) feet above the ground line. Measurement for stump will be made at a point two (2) feet above the ground line or at the top of the stump if it is less than two (2) feet in height.

209.02.2 - Payment

Selective Removal of Tree or Stump shall be paid at the Contract unit price bid on a PER EACH basis for the specific size as listed in the Contract Documents.

The tree or stump of less than six (6) inches in diameter will not be paid and any cost associated with their removal shall be included in other items of work. When the Contract does not include an item for Selective Removal of Tree

or Selective Removal of Stump, this work shall be considered as subsidiary work and the cost thereof shall be included in the Contract unit prices for other items.

209.03 - Removal of Obstructions

209.03.1 - Measurement

Removal of Obstructions shall be measured on a LUMP SUM basis. The measurement shall include all structures and obstructions encountered within the project limits in accordance with the provisions as set forth in this section. Where specific items are listed for removal on a unit basis in the Contract, they shall not be considered part of the work included in the lump sum item. Such items shall be measured on the following basis:

- | | | |
|----|----------------------------|-------------|
| 1. | Removal of Pipes | LINEAR FOOT |
| 2. | Removal of Curb and Gutter | LINEAR FOOT |
| 3. | Removal of Sidewalk | SQUARE YARD |
| 4. | Removal of Pavement | SQUARE YARD |
| 5. | Removal of Structures | PER EACH |

Measurement shall be made for the above items based on the method of measurement normally specified for the installation of similar type items. Measurement for Removal and Curb and Gutter shall be made at the flow line.

209.03.2 - Payment for Removal of Obstructions

Removal of Obstructions shall be paid at the Contract unit price bid on a LUMP SUM basis, except that removal of specific items listed in the Contract shall be paid as measured. Miscellaneous structures (flowerbeds, concreted fence posts, lawn sprinkling systems, abandoned irrigation structures, etc.) either shown or not shown on the Plans shall be removed and disposed of by the Contractor. All costs involved in these items shall be included as part of the cost of this item.

When the Contract does not include an item for Removal of Obstructions, this work shall be considered as subsidiary work and all costs thereof shall be included in the Contract unit prices for other earthwork items.

Concrete saw work necessary for the removal of sidewalk, driveways, curb and gutter, etc. will not be paid for separately, and all costs thereof shall be included in the Contract unit prices for the various items requiring such work.

209.03.3 - Payment for Removal of Pipes

Removal of Pipes shall be paid at the Contract unit price bid on a LINEAR FOOT basis.

When the Contract does not include an item for Removal of Pipes, this work shall be considered as subsidiary work and all costs thereof shall be included in the Contract unit prices for other earthwork items.

209.03.4 - Payment for Removal of Curb and Gutter

Removal of Curb and Gutter shall be paid at the Contract unit price bid on a LINEAR FOOT basis.

When the Contract does not include an item for Removal of Curb and Gutter, this work shall be considered as subsidiary work and all costs thereof shall be included in the Contract unit prices for other earthwork items.

209.03.5 - Payment for Removal of Sidewalk

Removal of Sidewalk shall be paid at the Contract unit price bid on a SQUARE YARD basis.

When the Contract does not include an item for Removal of Sidewalk, this work shall be considered as subsidiary work and all costs thereof shall be included in the Contract unit prices for other earthwork items.

209.03.6 - Payment for Removal of Pavement

Removal of Pavement shall be paid at the Contract unit price bid on a SQUARE YARD basis.

When Removal of Pavement is not specified in the Contract as a separate bid item, it shall be measured and paid as part of the item for ROADWAY EXCAVATION and any additional costs associated with the removal of such pavement shall be included in the Contractor's unit bid price.

209.03.7 - Payment for Removal of Structures

Removal of Structures shall be paid at the Contract unit price bid on a PER EACH basis.

When the Contract does not include an item for Removal of Structures, this work shall be considered as subsidiary work and all costs thereof shall be included in the Contract unit prices for other earthwork items.

209.04 - Obliteration of Street

209.04.1 - Measurement

The various classes of Obliteration of Street shall be measured on a LINEAR FOOT basis along the centerline of the road obliterated outside the excavation or embankment limits of the new construction.

209.04.2 - Payment

The various classes of Obliteration of Street shall be paid at the Contract unit price bid on a LINEAR FOOT basis.

When the Contract does not include an item for Obliteration of Street any cost associated therewith shall be considered as incidental and shall be included in the unit bid prices for other items.

209.05 - Roadway Excavation

209.05.1 - Measurement

The following earthwork operations will be measured as Roadway Excavation for the quantities of material involved:

1. Excavating the roadway prism, including public and private street and alley approaches, connections and driveways.
2. Excavating parking lot areas.
3. Excavating unsuitable material when shown on the Plans, specified in the Special Provisions or directed by the City Engineer.
4. Excavating ditches or channel changes.
5. Excavating surplus material.
6. Excavating selected material and topsoil from within the limits of the project.

All Excavation may be measured by the CUBIC YARD in its original position from field survey or photogrammetric cross sections, using the average end area method with no correction for curvature. Excavation may also be measured by the cubic yard in its original position from field survey or photogrammetric triangulation, using computer generated surfaces. The City Engineer shall select which volume computation method is to be used. The excavation and disposal of "unsuitable material" ("soft spots") will be measured by any of the methods described above or by the cross-sectional or three-dimensional measurement of the hole or excavated area remaining after the said unsuitable material has been removed. The City Engineer shall select the volume computation method to be used for "unsuitable material" excavation also.

Rock Excavation shall be measured using the average end area method by the CUBIC YARD in its original position or by any of the methods described previously. Overbreak will not be included in the measurement of Rock Excavation. The City Engineer shall select the volume computation method to be used for Rock excavation.

Where it is impractical to measure material by either the average end area method or in its original position, alternate practical methods with appropriate adjustments may be used. The measurement will not include the volume of any material, which is used for purposes other than those directed.

Geotextile Fabric shall be measured on a SQUARE YARD basis. The measurement of length and width shall be measured to include the horizontal distance in the bottom of the excavation; the vertical distance up each side of the excavation and eighteen (18) inches for the lap at the top of the excavation. Overlaps for splices will not be measured.

Process Old Street or Roadway shall be measured by the UNIT. A UNIT shall be one thousand (1,000) square yards measured on a horizontal projection of the subgrade surface.

209.05.2 - Payment for Roadway Excavation

Roadway Excavation including those items listed in the Measurement Section, which do not have a unit price in the Contract Documents, shall be paid by the CUBIC YARD at the Contract unit price bid. Payment for Roadway Excavation shall be considered as full compensation for excavation, sloping, rounding tops and ends of excavation, loading, disposing of surplus material, stockpiling and/or hauling it to its final location. If, in the opinion of the City Engineer, the Contractor's negligent actions or inaction in protecting the work result in the removing and replacing of unsuitable materials, all expenses associated with the work shall be assumed by the Contractor. Excavation in excess of the authorized cross section will not be paid.

Where required by the Plans or Special Provisions or where directed by the City Engineer, the excavating and stockpiling of certain selected material will be paid for at the Contract unit price for Roadway Excavation. Removing such Selected Material from the stockpile and placing it in its final position will also be paid for at the Contract unit price bid for Roadway Excavation. The Contractor may stockpile materials at his own option; however, no separate payment will be made for excavating material from an optional stockpile and placing it in its final position.

No separate payment will be made for excavating topsoil that has been temporarily stockpiled along the toes of slopes and placing it in its final position on the slope for erosion control or planting work, whether or not required by the Contract Documents or by the City Engineer.

Water for dust abatement and all work or costs associated with this item shall be considered as subsidiary and the costs thereof included in the costs of other items.

209.05.3 - Payment for Rock Excavation

Rock Excavation shall be paid by the CUBIC YARD at the Contract unit price bid. Rock Excavation made below subgrade elevations shall not be paid unless such excavation is required by the Plans or as directed by the City Engineer. Borrow material needed to replace any unauthorized Rock Excavation below subgrade shall not be paid.

When a specific bid item for Rock Excavation is not included in the Contract Documents, the quantity shall be included in the item for Roadway Excavation and paid for under that item.

209.05.4 - Payment for Geotextile Fabric

Geotextile Fabric shall be paid at the Contract unit price bid on a SQUARE YARD of plan area basis. There shall be no additional payments made for overlaps or splices. The payment shall be full compensation for all labor, materials and equipment necessary to install the Geotextile Fabric complete and in place as shown in the Plans and as directed by the City Engineer.

When a specific bid item for Geotextile Fabric is not included in the Contract Documents, the costs shall be included in other items of the Contract.

209.05.5 - Payment for Process Old Street or Roadway

Process Old Street and Roadway shall be paid at the Contract unit price bid on a UNIT basis.

No separate payment shall be made for Process Old Street or Roadway in area of Class "C" Compaction.

When a specific bid item for Process Old Street or Roadway is not included in the Contract Documents, the costs shall be included in other items of the Contract.

209.06 - Class "C" Compaction

209.06.1 - Measurement

Class "C" Compaction shall be measured on a UNIT basis. A UNIT shall be one thousand (1000) square yards measured on a horizontal projection of the subgrade surface.

209.06.2 - Payment

Class "C" Compaction shall be paid at the Contract unit price bid on a UNIT basis.

When a specific bid item for Class "C" Compaction is not included in the Contract Documents, the costs shall be included in other items of the Contract.

209.07 - Haul

209.07.1 - Measurement

Haul shall be measured on a YARD UNIT basis. A YARD UNIT shall be defined as ten (10) cubic yards of material measured in its original position hauled one thousand (1,000) feet.

For material obtained from excavation two (2) points three thousand two hundred eighty (3,280) feet apart shall be determined, one on each side of the neutral grade point as indicated on the final construction haul diagram and so located that the included quantities of excavation and the included quantities of embankment as measured by the method selected by the City Engineer shall balance. The distance between the center of volume of the remaining excavation and the center of volume of the resulting embankment, less three thousand two hundred eighty (3,280) feet, shall be the length of haul.

The length of haul multiplied by the quantities hauled in excess of the free haul distance and included in the accepted pay quantities converted to the nearest whole yard unit, shall be the pay quantity of the haul. Determination of pay haul quantities from the haul diagram as prepared by the City Engineer, by means of measurement with a polar planimeter of the areas representing pay haul quantities, shall be considered as a sufficiently accurate method.

For borrow and granular borrow, the length of haul shall be the distance between the center of volume of the source and the center of volume of the deposited material, measured along the shortest practicable route as determined by the City Engineer, with no deduction for free haul. Determination of the center of volume of the deposited material, by scaling from the haul diagram as prepared by the City Engineer, shall be considered as a sufficiently accurate method.

209.07.2 - Payment

Haul shall be paid at the Contract unit price bid on a YARD UNIT basis. The payment shall be considered as full compensation for all costs and expenses involved in the transportation and handling of the materials.

If no pay item is included in the Contract for Haul, all costs associated with Haul shall be included in other Contract items associated with this work.

209.08 - Roadway Embankment

209.08.1 - Measurement

Borrow and Granular Borrow will be measured by the CUBIC YARD for the material in its final compacted state as measured by cross-sectional methods or by the “plan quantities” per station or per location if such method of measure is specifically called out on the Project Plans. Measurement of material removed from required stockpiles will be based on the volume it occupies in its final position, after compaction.

Topsoil shall be measured in place on a CUBIC YARD basis as shown on the Plans or as called out in the Special Provisions.

Where it is impractical to measure material by either the average end area method or in its original position, alternate practical methods with appropriate adjustments may be used. The measurement will not include the volume of any material, which is used for purposes other than those directed.

209.08.2 - Payment for Borrow

Borrow shall be paid at the Contract unit price bid on a CUBIC YARD basis.

209.08.3 - Payment for Granular Borrow

Granular Borrow shall be paid at the Contract unit price bid on a CUBIC YARD basis.

209.08.4 - Payment for Topsoil

Topsoil shall be paid at the Contract unit price bid on a CUBIC YARD basis. Topsoil in its final position will be paid for at the unit bid price for Topsoil, which price shall include the cost to stockpile (if necessary), to haul to the site where it is to be used and to place and finish on the slope or other designated areas.

When a specific bid item for Topsoil is not included in the Contract Documents, the costs shall be included in other items of the Contract.

209.09 - Aggregate Base

209.09.1 - Measurement

Aggregate Base material shall be measured either on a:

1. CUBIC YARD basis for the indicated plan quantity for the main roadway and by cross-sectional measurement or truck measure for roadway transition, connections, approaches, etc.
2. TON basis, except that moisture in the aggregate in excess of seven (7) percent will be deducted.

Measurement shall be by the type of units (cubic yards or tons), compacted in place, as called for on the Plans, in the Specifications or in the Contract.

209.09.2 - Payment

Aggregate Base shall be paid at the Contract unit price bid on a CUBIC YARD or TON, compacted in place, as specified on the Plans, in the Specifications or in the Contract. The Contractor shall supply the source for all Aggregate Base material unless otherwise called for in the Plans or Specifications. The cost of furnishing the source, crushing, loading, hauling, placing and all other related costs and expenses shall be included in the Contract unit price bid associated with furnishing the Aggregate Base compacted in its final position.

209.10 - Structure Excavation and Structure Backfill

209.10.1 - Measurement

Structure Excavation shall be measured on a CUBIC YARD basis for material in its original position, using the average end area method with the yardage being determined as that volume within a prism with limiting planes as follows:

1. The bottom of the foundation.
2. The vertical planes two (2) feet outside of and parallel to the outside lines of the structure. In the case of bents with individual column footings, the entire bent shall be considered as one structure.
3. With upper limits as follows:
 - a. In embankment sections, the existing ground surface as cross-sectioned.
 - b. In roadway cut sections or channel changes, the planes of the roadway cut or channel change as excavated.

In lieu of the limits listed above the City Engineer may show the Structure Excavation limits in the Plans and measurement shall be made using the average end area method, field survey, and/or photogrammetric triangulation, using computer generated surfaces. The payment volume shall be all material within the limiting planes shown in the Plans.

If the Contractor is directed to remove material below the designed elevation, the excavation will be paid for at the Contract unit price for Structure Excavation.

Structure Backfill shall be measured on a CUBIC YARD basis for backfill material placed with the volume being determined as follows:

1. Below the original ground surface: A volume equal to the volume of structure excavation less the volume of the permanent structure including openings, contained within the limits of measurement for structure excavation.
2. Above the original ground surface: The volume contained between the outside walls of the structure and vertical planes four (4) feet outside thereof; the original ground surface; and a horizontal plane even with the top of the structure or even with the subgrade, whichever is the lesser.

The Occupational Safety and Health Act (OSHA) requirements for trench safety may result in a larger excavation than included in the measurement. No measurement or payment will be made to excavate, backfill, and compact material removed for safety purposes.

209.10.2 - Payment for Structure Excavation

Structure Excavation shall be paid at the Contract unit price bid on a CUBIC YARD basis.

When the Contract does not include an item for Structure Excavation, this work shall be considered as subsidiary work and the cost thereof included in the Contract unit prices for other items.

209.10.3 - Payment for Structure Backfill

Structure Backfill shall be paid at the Contract unit price bid on a CUBIC YARD basis.

When the Contract does not include an item for Structure Backfill, this work shall be considered as subsidiary work and the cost thereof included in the Contract unit prices for other items. Any backfill material or bedding material required, whose source is other than Structure Excavation, will be paid for at the Contract unit price for the material being used or as extra work if no unit price has been established.

209.10.4 - Payment for Structure Backfill Concrete

Structure Backfill Concrete shall be paid at the Contract unit price bid on a CUBIC YARD basis.

Class 2 concrete used to backfill rock excavation below the bottom of the designed footing grade will be paid for on the actual quantity used, based on weigh or batch tickets delivered to the City Engineer, but not to exceed a prism one (1) foot outside the footing neat lines and an average of one (1) foot depth below the bottom of footing.

**CITY OF IDAHO FALLS
PUBLIC WORKS DIVISION
ENGINEERING DEPARTMENT**

**STANDARD SPECIFICATIONS
FOR
CONSTRUCTION
SURFACE COURSES
AND PAVEMENT
SECTION 300**

2010 EDITION

**STANDARD SPECIFICATIONS FOR CONSTRUCTION
SURFACE COURSES AND PAVEMENT
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SURFACE COURSES AND PAVEMENT

SECTION 300

300 - SUBINTRODUCTION

During all asphaltting operations, precautions shall be exercised to prevent marring or discoloring adjacent improvements and adequate protection against such possibilities shall be provided. In the event such improvements become discolored by asphalt, the Contractor, at his own expense, shall remove the discoloration in a satisfactory manner and, if required, repaint the surfaces.

The particular grade or grades of asphalt to be used on any project will be those called for in the Special Provisions, on the Plans or in these Specifications. The grade may be changed one step by the City Engineer at no change in unit price. Asphalt furnished shall meet the applicable requirements and will be accepted at the point of delivery. The use of grades of asphalt other than those called for on the Plans or in the Special Provisions will not be allowed. Any work, which proves to be defective because of the use of unauthorized grades of asphalt, shall be repaired or removed at the expense of the Contractor, if ordered by the City Engineer.

All new pavements, with the exception of Pathways and Parking Lots, shall be sealed with an approved seal coat a minimum of thirty (30) days after placement and a maximum of one construction season after placement of the new pavement.

301 - MATERIALS

301.01 - Asphalt

Asphalt of the grade specified shall fully comply with all of the requirements hereinafter set forth for each respective grade. Asphalt furnished under these Specifications shall not have been distilled at a temperature high enough to injure by burning or to produce flecks of carbonaceous matter and upon arrival at the work shall show no signs of separation into lighter and heavier components. Lots placed in storage for subsequent shipment shall be thoroughly mixed so there will be no appreciable difference in properties between individual shipments.

301.01.1 - Emulsified Asphalts

Emulsified asphalts shall conform to the following requirements. The requirements for sieve tests shall be deleted for asphalt tie-down.

Anionic emulsified asphalt	AASHTO M 140
Cationic emulsified asphalt	AASHTO M 208¹
¹ Except saybolt viscosity of CRS-2 shall be in the range from one hundred fifty (150) minimum to four hundred (400) maximum.	

This Specification shall be modified to include a CRS-2h grade having the same properties as CRS-2 except the penetration test on residue shall be fifty to one hundred (50-100) and all grades of Rapid-Setting emulsion shall be homogeneous after thorough mixing within fifteen (15) days after delivery. All grades of Rapid-Setting emulsion shall be homogeneous after thorough mixing within fifteen (15) days after delivery.

CRS-2R shall be emulsified blend of asphalt, rubber, water and emulsifiers. The asphalt cement shall be thoroughly blended with a minimum of one-point-five (1.5) percent total rubber solids. The emulsified blend shall conform to the following requirements:

Property	Specification	Test Method
Viscosity, Saybolt Furol at 122°F, Seconds	150-400	AASHTO T 59
Storage stability test, 24 hours, percent	1.0 Max.	AASHTO T 59
Demulsibility test, percent	40 Min.	AASHTO T 59
Particle charge test	Positive	AASHTO T 59
Sieve test, percent	0.10 Max	AASHTO T 59
Oil distillate by distillation: Oil distillate by volume of emulsion, percent	3.0 Max.	AASHTO T 59
Residue by evaporation, percent	65 Min.	AASHTO T 59 (Method B)
Test on residue: Penetration, 77°F, 3.5 oz. (100g), 5 seconds	80-150	AASHTO T 59, AASHTO T 49

301.01.2 - Liquid Asphalts

Liquid Asphalt Requirements	
Rapid curing asphalts	AASHTO M 81.
Medium curing asphalts	AASHTO M 82.
Slow curing asphalts	ASTM D 2026.

Liquid Asphalts Rubberized			
	Specification		
Property	RC 3000R	RC-800R	Test Method
Flash Point, T.O.C., °F	80 Min.	80 Min.	ASTM D 1310
Visc. @ 140°F, cst	3000-6000	800-1600	ASTM D 2170
Distillation: 30 in Hg % of Total Dist. to 680°F			ASTM D 402
To 437°F	15 Min.		
500°F	25 Min.	45 Min.	
600°F	70 Min.	75 Min.	
Res., Vol. % by Difference	80 Min.	75 Min.	
Test on Rubberized Base Asphalt:			
Viscosity @ 140°F Poise	1600-2400	1600-2400	ASTM D-2171
Duct @ 77°F (5 cm/min) cm	150 Min.	150 Min.	ASTM D 113
Duct @ 39°F (5 cm/min)cm	35 Min.	35 Min.	ASTM D 113
Toughness, inch-pounds	75 Min.	75 Min.	*
Tenacity, inch-pounds	50 Min.	50 Min.	*
* Benson Method of Toughness and Tenacity, Scott Tester, inch-pounds @ 77°F, twenty (20) inches per minute pull. Tension head seven-eighth (7/8) inch diameter.			

Sampling - Rubberized Base Asphalt samples taken at point of manufacture of the liquid asphalt shall be the material tested for compliance of Rubberized Base Asphalt. Liquid asphalt samples taken at point of delivery will be tested for compliance of properties other than rubberized base asphalt requirements.

301.01.3 - Asphalt Cements

Asphalt cements shall conform to AASHTO MP-1 Standard Specification for Performance Graded Asphalt Binder. The Grade of Asphalt shall be PG 58 - 28 unless otherwise specified in the Special Provisions and / or the Plans. Anti-Stripping Additive shall be added to the Asphalt Cement as specified in Subsection 301.02 of these Standard Specifications at no additional cost to the City \ Owner.

Unless otherwise permitted, the product of only one supplier, or source and grade of asphalt cement shall be used at any one time. Field blends of asphalt will require new mix design and approval.

301.02 - Anti-Stripping Additive

If Immersion Compression test (AASHTO T-165) results on the plantmix show less than eighty-five (85) percent retained strength, the asphalt shall be treated with an approved heat stable antistripping additive in the amount of one half (0.5) percent or one (1) percent by weight of asphalt cement. The exact amount of antistripping additive shall be the percentage that yields the greatest retained strength. Samples of the treated asphalt shall be tested in accordance with Idaho T-99. Material, which fails to indicate the presence of anti-strip, shall be rejected and removed from the work.

Samples of the proposed anti-strip and asphalt shall be submitted to the City Engineer for approval prior to use. Testing and acceptance will be in accordance with Idaho T-137.

301.03 - Fly Ash

Fly ash shall conform to AASHTO M 295 except that loss on ignition (LOI) shall not exceed one-point-five (1.5) percent for all classes. The Contractor shall submit the manufacturer's certification of material class and conformance to material specifications. Fly ash will be accepted at the point of delivery.

301.04 - Blotter

Blotter shall meet the requirements set forth below when tested in accordance with AASHTO T 11 and T 27:

Sieve Size	Percent Passing
3/4-Inch	100
No. 4	40-100
No. 200	0-16

301.05 - Cover Coat Material

Unless otherwise specified in the Plans or Special Provision the Contractor shall provide Conventional Cover Coat Material. The gradation of the aggregate for cover coat material shall be within the limits outlined below when tested in accordance with AASHTO T 11 and T 27:

Conventional Cover Coat (Can be used on both Residential and Arterial Streets)	
Sieve Size	Percent Passing
1/2-Inch	100
3/8-Inch	40-90
No. 4	0-15
No. 8	0-5
No. 200	0-2

Special Cover Coat (Can be used on both Residential and Arterial Streets)	
Sieve Size	Percent Passing
1/2-Inch	100
3/8-Inch	70-90
No. 4	0-5
No. 8	0-3
No. 200	0-1

Cover Coat for Residential Streets Only	
Sieve Size	Percent Passing
1/2-Inch	100
3/8-Inch	95-100
No. 4	0-15
No. 8	0-5
No. 200	0-2

Cover coat material shall have a cleanness value of not less than seventy-five (75) when tested in accordance with Idaho T-72 and seventy (70) percent by weight of the particles retained on the number four (4) screen shall have at least one fractured face when tested in accordance with AASHTO TP-61, Method 1.

301.06 - Aggregate

For all types of plantmix aggregate, the Contractor shall select a target gradation that is within the specified gradation bandwidth. After the target gradation is selected, all mixtures furnished shall conform to the specified bandwidth and the tolerances specified in the table below whichever is more restrictive.

Item	Tolerance
Percent Retained on # 4 and Larger Sieves	± 6% About Target Gradation
Percent Passing # 4 and Smaller Sieves to # 200	± 4% About Target Gradation
Percent Passing # 200	± 2% About Target Gradation

Unless otherwise approved by the City Engineer the blend gradation for all types of plantmix shall be outside the following gradation limits (Restricted Zone):

Sieve Size	Percent Passing
No. 16	23-28
No. 30	18-23

Sampling and testing shall be conducted at the hot plant as necessary to assure that the uniformity of the aggregate gradation is maintained.

Before processing through the asphalt hot plant, the aggregate sand equivalent shall not be less than thirty-five (35) when tested in accordance with AASHTO T 176, Alternate Method No. 2. If the aggregate is separated, the sand equivalent requirement applies to the combined material. If the specified aggregate includes material retained on the one half (1/2) inch sieve, then ninety (90) percent of the material retained on the one-half (1/2) inch Sieve and larger sieves shall have a minimum of one fractured face. Sixty (60) percent of the plus No. 4 material shall have a minimum of two (2) fractured faces. Thin or elongated Aggregate particles (length greater than five (5) times average thickness) shall not exceed fifteen (15) percent by weight in the plus No. 4 material.

Multiple stockpiles of plantmix aggregate may be required to insure that the cold feed materials comply with specifications.

301.06.1 - Conventional Plantmix Pavement Aggregate

Unless otherwise specified, the gradation of the aggregate for plantmix pavement shall be within the limits of the table below when tested in accordance with AASHTO T 11 and T 27:

Sieve Size	Percent Passing
3/4-Inch	100
1/2-Inch	80-100
No. 4	48-70
No. 8	30-55
No. 50	10-23
No. 200	4-10

301.06.2 - Overlay Plantmix Pavement Aggregate

Residential street sections or when asphalt plantmix pavement for overlays is specified, the gradation of the aggregate shall be within the limits of the table below when tested in accordance with AASHTO T 11 and T 27:

Sieve Size	Percent Passing
1/2-Inch	100
3/8-Inch	90-100
No. 4	60-85
No. 8	40-65
No. 30	20-40
No. 50	12-28
No. 200	6-10

301.06.3 - Large Stone Plantmix Pavement Aggregate

Commercial street sections or when large stone asphalt plantmix pavement is specified, the gradation of the aggregate shall be within the limits of the table below when tested in accordance with AASHTO T 11 and T 27:

Sieve Size	Percent Passing
1-1/2 Inch	100
1-Inch	95-100
3/4-Inch	80-95
1/2-Inch	60-80
No. 4	30-50
No. 8	20-40
No. 200	2-10

301.07 - Paving Fabric

Paving fabric shall be a non-woven fabric meeting the following requirements:

Required Values	Property	Test Method	Units
90	Tensile Strength	ASTM D 4632-91	Lb
50	Tensile Elongation	ASTM D 4632-90	%
0.20	Asphalt Retention	TX DOT 3099	Gal/yd ²
300	Melting Point	ASTM D 276-87	°F
Heat Set on One Side	Surface Texture	Visual Inspection	

302 - EQUIPMENT

302.01 - Rollers

The Contractor shall furnish the City Engineer with the weight of each roller by:

1. Manufacturer's rating attached to the roller.
2. Manufacturer's specifications
3. Direct scale reading.

Prior to placement of any plantmix the Contractor shall have on site a minimum of two (2) steel double drum tandem axle vibratory rollers and one (1) steel single drum tandem axle roller, with operators, meeting the requirements of this subsection. All rollers shall be approved by the City Engineer and shall be in good repair and fully operational during all paving operations.

302.01.1 - Steel Rollers

Steel rollers shall consist of three (3) wheel or tandem type self-propelled rollers equipped with cleaning devices to prevent adhesion of material to the wheels. Tandem axle rollers for use on plantmix and roadmix shall weigh seven point seven-one to twelve point twelve (7.71-12.12) tons. A three (3)-axle tandem weighing nine point nine-two to fourteen point three-three (9.92 -14.33) tons may be permitted for finish rolling.

302.01.2 - Pneumatic-Tire Rollers

Wherever required and permitted by specifications, self-propelled rollers with adequate power to perform the required compaction shall be furnished. Pneumatic-tire rollers for use on seal coats, surface treatment and roadmix pavement shall meet the requirements of Group Numbers one through four (1-4) and pneumatic-tire rollers for compacting plantmix pavement shall meet the requirements of Groups Numbers two, three or four (2, 3, or 4) as follows:

Pneumatic-tire rollers used on seal coats, surface treatments, and roadmix pavement shall use tire pressures of fifty-five (55) psi and wheel loadings of two hundred twenty point four (220.4) pounds per inch width of tire. Tire size shall be as indicated on the tire sidewall.

Pneumatic-tire rollers used for compacting plantmix pavement shall use tire inflation pressures of one-hundred ten (110) psi and minimum wheel loadings of three hundred ninety six point eight (396.8) pounds per inch of tire width.

Rollers shall be equipped with smooth compactor tires. The use of wobble-wheel rollers whose tires revolve in a plane that is not at right angles to

axle shaft will not be permitted. The air pressure in any tire shall not vary more than five (5) psi from the pressure required. For use on seal coats and surface treatments the rollers shall be operated at speeds not less than three (3) nor more than eight (8) miles per hour unless otherwise provided or directed. Pneumatic rollers shall not be used for finish rolling on asphalt surface courses.

302.01.3 - Vibratory Rollers

Wherever required and permitted by the specifications, the Contractor shall furnish vibratory rollers, which are adequately designed and powered to perform the required compaction. They shall be of sufficient size and number to keep up with roadway production while providing the required density.

Vibratory rollers for use on plantmix base and surfacing shall be operated within the speed and frequency ranges shown in the following table. The frequency rate shall be such that at least ten (10) impacts per linear foot of distance traveled by the roller are achieved at all times. The following table indicates the number of impacts per linear foot of travel that will occur when the roller is operated within the frequency and speed ranges allowed.

Asphalt Paving Impacts Per Foot								
Roller Speed	VPM = Vibrations Per Minute							
Ft./min.	1600	1800	2000	2200	2400	2600	2800	3000
88	18	20	23	25	27	30	32	34
132	12	14	15	17	18	20	21	23
176		10	11	13	14	15	16	17
220				10	11	12	13	14
264							11	11
Ten (10) or more impacts per linear foot are required to avoid washboards.								

The roller vibration frequency shall be a minimum of sixteen (1600) vibrations per minute (VPM) and can be determined by the use of a properly calibrated multiple vibratory reed tachometer (Frahm brand or equivalent). Rollers shall be operated at low amplitude unless otherwise directed. Only drum type rollers with a static force on drums of one hundred twenty point two (123.2) pounds per inch and total applied force on vibrating drums (dynamic plus static) of three hundred twenty four point eight (324.8) pound per inch will be permitted.

Rollers shall be equipped with spray bars to prevent pickup of asphalt material and shall be self-propelled. Vibrators shall be shut off whenever the roller stops. On tender mixes, or steep grades, and whenever directed, rollers shall be operated as a static roller until the mix is dense enough to permit vibratory compaction with a minimum of displacement.

302.01.4 - Miscellaneous Rollers

Other types of rollers, specifically designed and manufactured for use on small areas of pavement and other special applications, may be used as approved by the City Engineer, provided satisfactory compaction is obtained. Grid rollers, vibratory pan compactors, tamping rollers and various special compactors will be classed as miscellaneous rollers.

302.02 - Mixing Plant

All mixing plants shall be capable of producing a uniform mixture and shall conform to the following requirements:

1. PLANT SCALES - Plant and truck scales shall conform to the MEASUREMENT AND PAYMENT section of the GENERAL CONDITIONS.
2. ASPHALT STORAGE - Tanks for asphalt storage shall be equipped to heat and hold the materials at the required temperatures. Heating shall be accomplished so that no flame shall be in contact with the tank. The circulating system for the asphalt shall be designed to assure proper and continuous circulation. During the operating period, provisions shall be made for measuring and sampling storage tanks.
3. 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.
4. DRYER - The plant shall include a dryer or dryers which continuously agitate the aggregates during the heating and drying process.
5. ASPHALT CONTROL UNIT - Satisfactory means, either by weighing or metering, shall be provided for obtaining and checking the amount of asphalt in the mix. The control unit shall be capable of maintaining the asphalt content as determined by AASHTO TP53 within plus or minus zero point two (0.2) percent of the City Engineer approved target value.
6. THERMOMETRIC EQUIPMENT - Recording thermometric equipment shall be provided to indicate the temperature of the

7. **SAMPLING DEVICES** - The plant shall be equipped with adequate sampling devices to maintain control.

Continuous mixing plants and dryer-drum mixing plants shall conform to the requirements above and the following requirements:

1. The Plant shall be equipped with a discharge hopper with dump gates which will permit rapid and complete discharge of the mixture.
2. The system shall provide positive weight control of the cold aggregate feed by use of a belt scale or other device, which will automatically regulate the feed gate. The feed shall be capable of rapid adjustment and shall maintain a consistent and uniform flow throughout the range of its calibration.
3. Satisfactory means shall be provided to afford positive control between the flow of aggregate and the flow of asphalt from the meter or other proportioning device. This control shall be accomplished by interlocking mechanical means or by any other positive method. Each compartment bin shall have an accurately controlled orifice measuring the aggregate drawn from each compartment. The orifice shall be rectangular with one (1) dimension adjustable by positive mechanical means.
4. Dryer-Drum Plants shall be equipped with automatic burner controls.

302.03 - Hauling Equipment

Trucks used for hauling plantmix materials shall have tight, clean, smooth metal beds. When necessary, each truck shall have a cover of canvas or other suitable material to protect the mixture from the weather.

The temperature of the plantmix shall not drop more than twenty (20°F) degrees Fahrenheit between the hot plant and the paver.

Hauling trucks that contact the paving machine during the dumping or spreading process at any point other than the pushing rollers on the paving machine will not be allowed.

302.04 - Pavers

Pavers shall be self-propelled units, provided with an activated (vibrating) heated screed. Only screed extensions, which produce a satisfactory result equal to the rest of the screed, will be allowed.

The paver shall be equipped with a receiving hopper having a 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. The screed shall be equipped with automatic controls, which will make adjustments in both transverse and longitudinal directions. The sensing device shall be adaptable to picking up grade information from a string line, rail or ski. In the event of failure of the automatic controls, the Contractor will be permitted to finish the day's run using manual controls, but he will not be permitted to resume operations until the controls are repaired.

The paver shall be operated at a speed consistent with the delivery of the plantmix, which provides for a smooth, uniform forward travel with the least stops.

302.05 - Asphalt Distributor

The asphalt distributor shall be so designed, equipped, maintained and operated that asphalt may be applied uniformly on variable widths of surface at readily determined and controlled rates with uniform pressure. Distributor equipment shall include a tachometer, pressure gauges, accurate measuring devices or a calibrated tank and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump and full circulation spray bars adjustable vertically.

302.06 - Aggregate Spreader

The aggregate spreader shall be self-propelled of approved design supported by at least four (4) wheels equipped with pneumatic tires on two (2) axles. The aggregate spreader shall be equipped with positive controls so that the required amount of material will be deposited uniformly over the full width required.

302.07- Rotary Power Broom

Rotary power broom shall be either self-propelled or pull-behind unit in good condition and capable of sweeping a path at least seventy (70) inches wide.

302.08 - Pick-up Broom

Pick-up broom shall be self-propelled of approved design, such as a street sweeper, in good condition and capable of sweeping a path at least seventy (70) inches wide. Primary use of this type of broom will be in curb and gutter areas.

304 - TESTING

304.01 - Asphalt

The City Engineer will sample asphalt in accordance with AASHTO T40 in the field. The Supplier shall ship by prepaid express a sample, if required, of asphalt taken from each load or other lot that is shipped for use on work under the jurisdiction of the City. The sample shall consist of one (1) quart of asphalt taken from the total shipment of asphaltic material in accordance with AASHTO T 40 at the refinery. It shall be properly labeled and forwarded promptly to the City Engineer or to a laboratory designated by him. Asphalt testing will be in accordance with the appropriate AASHTO and ASTM Test Methods. The presence of anti-stripping additive will be checked for in accordance with Idaho T-99. The costs of these initial tests shall be borne by the Owner, but the Contractor shall pay for any subsequent testing. Asphalt will be accepted at point of delivery.

304.01.1 - Loading Certificate

A copy of the loading certificate providing the following information shall accompany each shipment of asphalt:

1. Contractor and Project Number.
2. Refinery.
3. Supplier, if other than Refinery.
4. Car or Delivery Ticket Number.
5. Type and Grade of Asphalt.
6. Specific Gravity.
7. Temperature when Loaded.
8. Shipment.
 - a. TRUCK - Individual certified weights of each loaded truck and trailer and the tare weight of each vehicle. Individual compartment asphalt weight must be certified for multiple compartment-hauling units.
 - b. RAILROAD CAR - Certified volume of asphalt loaded and the weight of the asphalt loaded computed from the volume corrected in accordance with the MEASUREMENT AND PAYMENT section of the GENERAL CONDITIONS.
9. The consistency of the material in terms of viscosity or penetration as appropriate.
10. The signature of authorized refinery or supplier representative.

11. When an anti-stripping additive is specified, the percentage of additive by weight of asphalt and the brand, grade or type of additive must be shown on the loading certificate.

304.02 - Plantmix Pavement

Tests on plantmix pavement shall be made in accordance with the following applicable standard methods:

Particle Size Distribution of Fine and Coarse Aggregates	AASHTO T2, AASHTO T11, AASHTO T27, AASHTO T248
Hveem Method of Testing Asphalt Mixtures for Relative Stability	AASHTO T 246
Percentage of Crushed Particles	AASHTO TP 61
Bulk Specific Gravity and Maximum Specific Gravity (Rice Gravity) of Asphalt Paving Mixtures	AASHTO T166, AASHTO T209, AASHTO T269, AASHTO T275
Percentage of Coated Particles in Bituminous Mixtures	IT-96-98
Nuclear Method for Determination of the Density of an Asphalt Pavement	WAQTC TM-8
Binder Ignition Method of Determination of the Asphalt and the Gradation of Aggregate in Asphalt Mixture	AASHTO T-308
Determining Volume of Liquids in Horizontal or Vertical Storage Tanks	IT-120-98
Acceptable Nuclear Density of Plant Mix	WAQTC TM-8
Standard Method of Operation of the California Profilograph and Evaluation of Profiles	IR-140-07
Sampling Bituminous Paving Mixture	AASHTO T 168
Plastic Fines in Graded Aggregate and Soils by Use of the Sand Equivalent Test	AASHTO T 176

304.02.1 - Approved Testing Firm

An approved testing firm shall consist of an organization approved by the City Engineer with at least five (5) years prior experience in testing bituminous surfacing materials in the State of Idaho. Approval shall be based upon a resume of experience submitted to the City Engineer. The resume shall be submitted a minimum of two (2) weeks prior to starting any paving operations.

304.02.2 - Aggregate Testing

The Contractor shall subcontract with an approved testing firm to perform sampling and testing. The testing firm shall sample and test at random the cold feed for each two-hundred and fifty (250) tons of asphalt cement produced or once each working day whichever is greater. These results shall be submitted to the City Engineer prior to beginning paving on the next working day. The Contractor shall provide a written description of corrective action taken if test results show material is out of the tolerances described in this subsection. There shall be no paving until the City Engineer has approved the corrective action. Plantmix produced from aggregate materials that are out of specification shall be removed from the project at no additional cost to the City of Idaho Falls. No additional payment shall be made for traffic control or other associated items of work to remove and replace out of specification material. The Contractor shall be required to submit weigh tickets for all asphalt cement delivered to the project.

304.02.3 - Plantmix Testing

The Contractor shall subcontract with an approved testing firm to perform plantmix sampling and testing. The testing firm shall obtain two (2) samples at random from each working days production of plantmix. The samples shall be obtained in accordance with AASHTO T-168 from behind the lay down machine. Each sample shall be tested for asphalt content and aggregate gradation by the ignition method as specified in Subsection 304.02. Test results shall be submitted to the City Engineer prior to beginning paving on the next working day. The Contractor shall provide a written description of corrective action taken if test results show that asphalt content is not within the specified tolerance. There shall be no paving until the corrective action has been approved by the City Engineer and has been implemented.

304.02.4 - Compaction Testing

The Contractor shall subcontract with an approved testing firm to perform compaction testing. The testing firm shall test at random locations each three-hundred (300) feet of paver pass width. These results shall be submitted to the City Engineer prior to beginning paving on the next working day. The Contractor shall provide a written description of corrective action taken if test results show that compaction is not within the tolerances described in this subsection. There

shall be no paving until the corrective action has been approved by the City Engineer and has been implemented.

305 - CONSTRUCTION

305.01 - Materials

305.01.1 - Application Temperatures of Asphalt

Asphalt materials shall be heated to the temperature directed by the City Engineer within the limits shown in the accompanying table before they are applied to the roadway.

Type & Grade Of Asphalt	Distributor Spraying Temperatures in °F	
	Minimum	Maximum
Liquid Asphalts (SC, MC, RC)		
70	120	180
250	165	220
800	200	255
3000R	250	300
Emulsified Asphalt		
SS-1	50	140
CRS-2R	140	175
CHR-3P	140	175
Asphalt Cements	250	350

The temperature of paving asphalts when loaded for transporting to destination shall not be greater than four hundred (400°F) degrees Fahrenheit.

305.01.2 - Aggregate Source

Unless otherwise called for on the Plans or in the Special Provisions, the Contractor shall be responsible for providing the source of all aggregate and for securing the necessary variances to County zoning and regulations as may be required to allow the operation of hot plant equipment at the aggregate source site. This shall include any required dust collector system, wet wash system, etc. on the asphalt hot plant that may be required to meet County or State zoning and air pollution requirements.

All work involved in clearing and stripping any aggregate sources, including the handling of any unsuitable material encountered, shall be performed

by the Contractor and no additional compensation will be allowed for this work. In case the material deposit contains sand or other material, in excess of the Specification gradation requirements or of an unacceptable quality, such excess or undesirable material shall be removed and disposed of prior to crushing.

305.02 - Weather Limitations

Asphalt shall not be applied when surface or weather conditions would prevent proper construction. In general, it is the policy of the City to prohibit the application of any asphalt when the ground temperature is lower than fifty (50°F) degrees Fahrenheit. Asphalt may be applied to damp, but not wet, material subject to the determination of the City Engineer. Asphalt shall not be applied during rainfall or when an imminent storm threatens damage to the construction. The City Engineer shall determine whether the surface and materials are dry enough to proceed with construction.

305.03 - Prime Coat

This work shall consist of preparing and treating an existing surface with asphalt and blotter, if required, in accordance with these Specifications and in reasonably close conformity with the lines shown on the Plans and as established by the City Engineer. Prime coat shall only be used when traffic will be driving on the base for extended periods of time or when there is a strong possibility of the base becoming wet prior to paving.

Asphalt shall be of the type and grade called for in the Contract Documents. The grade may be changed one step by the City Engineer at no change in unit price.

305.03.1 - Preparation of Surface

Before the application of prime coat, the entire roadway surface, including all side street approaches, alley approaches, driveways, etc., shall be stable and unyielding in a medium damp condition free from irregularities and material segregation, true to line, grade and cross section and uniformly compacted.

305.03.2 - Application

Asphalt shall be applied to the width of the section to be primed by means of a pressure distributor in a uniform continuous spread. Care shall be taken that the application of asphalt at the junction of spreads is not in excess of the specified amount. Skipped areas or deficiencies shall be corrected.

Asphalt shall be applied at the rate of twenty-five hundredths (0.25) to five-tenths (0.5) of a gallon per square yard or as directed by the City Engineer at the specified temperatures. The pattern of application of shots and width and length of application of shots of asphalt material shall be such as to provide proper coverage of the crushed gravel base material, to provide proper widths to such

dimensions as to facilitate the most satisfactory coverage, lapping of subsequent adjacent applications and in such a manner as the City Engineer deems most satisfactory for the particular project.

Where concrete curb and gutter, sidewalk or other such facilities are adjacent to the area to be primed, the distributor shall be equipped with a splash board of such design as to prevent the spraying of asphalt on any such facilities. Hand sprayers shall be used to apply asphalt around radii or wherever else the asphalt coverage is insufficient.

Prior to the placement of asphalt material, the Contractor shall perform brooming, spotting and rolling as may be necessary to prevent pick-up or other damage to the surface. The prime coat shall be allowed to cure for a sufficient period of time to allow the cut back agents in the asphalt cement to dissipate from the mix prior to construction of the plantmix surface course pavement.

305.03.3 - Application of Blotter

If, after the application of the prime coat, but prior to the asphalt paving work, the asphalt fails to penetrate the roadway surface, blotter material shall be spread in the amount directed by the City Engineer to absorb the excess asphalt.

305.04 - Tack Coat

This work shall consist of preparing and treating an existing surface with asphalt in accordance with these Specifications and in reasonably close conformity with the lines shown on the Plans and as established by the City Engineer.

A tack coat shall be applied to the surface of any course if the surface is such that a satisfactory bond cannot be obtained between it and a succeeding course. The contact surfaces of all cold pavement, joints, curbs and gutters, manholes and the like shall be painted with either Grade SS1 Emulsified Asphalt or another approved asphalt material immediately before the adjoining new asphalt concrete surfacing is placed.

305.04.1 - Preparation of Surface

Existing surfaces 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. The edges of existing pavements, which are to be adjacent to new pavement, shall be cleaned to permit the adhesion of bituminous materials.

The surface shall be free of water, foreign material, dust, etc. To minimize public inconvenience, no greater area shall be treated in any one day than is

planned to be covered during the same day, unless authorized by the City Engineer.

305.04.2 - Application

If the asphalt concrete pavement is being constructed directly upon an existing hard-surfaced pavement, a tack coat of Grade SS-1 Emulsified Asphalt, at an approximate rate of five-hundredths (0.05) to one-tenth (0.10) of a gallon per square yard shall be uniformly applied upon the existing pavement preceding the placement of the new asphalt concrete pavement. A similar tack coat shall be applied to the surface of any new course of asphalt plantmix if its surface is such that, in the opinion of the City Engineer, a satisfactory bond cannot be obtained between it and the succeeding course.

The asphalt shall be uniformly applied with a pressure distributor. The tack coat shall be applied in such manner as to offer the least inconvenience to traffic and to permit one-way traffic without pick-up or tracking. Asphalt shall not be applied when surface or weather conditions would prevent proper construction.

When diluted emulsified asphalt is specified for the tack coat, approximately equal volumes of SS-1 Emulsified Asphalt and water shall be mixed prior to application.

305.05 - Paving Fabric

The Contractor shall install Paving fabric in reasonably close conformity with the lines and grades shown on the Plans and as directed by the City Engineer. The Contractor shall clean the existing asphalt plantmix pavement of any loose material prior to the placement of the tack coat. Placement of the fabric shall be made only if wind conditions are such that, in the City Engineer's opinion, a satisfactory placement of the fabric can be achieved. The tack coat shall be applied in a manner, which prevents drying before the fabric can be placed. No more fabric shall be placed than can be covered with the asphalt plantmix pavement that working day.

A tack coat, using the same grade asphalt cement as is used in the plantmix pavement that is placed over the fabric, shall be applied at a rate of two-tenths (0.20) gallon per square yard, and as directed by the City Engineer. Immediately after the application of the tack coat, the fabric shall be placed into the fresh asphalt in accordance with the manufacturer's recommendations. Care shall be taken in placing the fabric to ensure a wrinkle-free surface. Air bubbles are to be removed and the entire surface of the fabric shall be in complete contact with the surface. Any damaged or unacceptable sections of the fabric shall be removed and replaced at the Contractor's expense.

All fabric joints shall overlap a minimum of six (6) inches with additional tack coat asphalt applied at a rate of two-tenths (0.20) gallon per square yard, at

the overlap. Transverse joints will require hand application of tack coat asphalt. The joints shall be shingled to facilitate runoff. Transverse joints shall be shingled in the direction of paving to prevent edge pickup by the paver.

305.06 - Seal Coat

This work shall consist of an application of asphalt followed by an application of cover coat material, followed by a fog seal if fog seal is specified. The seal coat shall be applied in accordance with these Specifications and in reasonably close conformity with the lines shown on the Plans and as established by the City Engineer. The grade of asphalt may be changed one step by the City Engineer at no change in unit price.

Unless otherwise specified all asphalt for fog seal shall be emulsified CSS-1h diluted by 50%, which is equal parts of asphalt and potable water.

Unless otherwise specified, all asphalt for seal coating shall be CRS-2R.

Cul-de-sac turn around bulbs shall be seal coated by carbon seal conforming to Specifications contained herein. No seal coat with cover coat material will be applied within cul-de-sac turn around bulbs. Regular seal coating will be concluded at the tangent portion of the bulb. Following this point carbon seal shall be applied to the cul-de-sac bulb.

305.06.1 - Weather Limitations

Seal coating shall not be undertaken during damp or wet weather or after sundown. The pavement temperature shall be above eighty (80°) degrees Fahrenheit and the air temperature at least sixty (60°) degrees Fahrenheit and rising. Seal coating will not be done when the wind velocity exceeds fifteen (15) MPH, without specific approval from the City Engineer. If the bituminous pavement is completed too late in the year to construct the conventional seal coat, a fog coat may be required with the conventional seal coating to be completed during the prescribed period the following year.

305.06.2 - Equipment

The following equipment or its equivalent is required

1. A rotary power broom.
2. A minimum of two (2) pneumatic-tire rollers.
3. One aggregate spreader.
4. An asphalt distributor and equipment for heating asphalt.
5. A pickup broom for use in the curb and gutter areas.

305.06.3 - Traffic Control

Unless otherwise provided in the Special Provisions, the Contractor may plan his operations on the basis that the project will be closed to all traffic during working hours except emergency vehicles such as ambulances, fire and police. It shall be the responsibility of the Contractor to provide suitable methods, such as barricades, signs, flagmen, etc. to protect the seal coat. All traffic control shall be in accordance with the Manual on Uniform Traffic Control Devices. The cost of traffic control shall be considered as incidental to the construction and shall be included by the Contractor in his unit price bid for other items.

To protect the new seal coat in an intersection or high turning area, rejects or sand material may be spread using the chip spreader in a light covering of the seal coat. The reject material may have to be relocated during the maintenance period. All of the costs of the rejects and maintenance shall be borne by the Contractor.

305.06.4 - Application of Asphalt

Asphalt shall not be spread until the surface has been thoroughly cleaned as required and the section to be sealed has been approved. Asphalt shall be applied by means of a pressure distributor in a uniform continuous spread over the section to be treated and within the temperature range specified. Unless otherwise directed, the quantity of asphalt to be used shall be approximately forty-five hundredths (0.45) plus or minus five hundredths (0.05) of a gallon per square yard for CRS-2R, thirty-five hundredths (0.35) plus or minus five hundredths (0.05) of a gallon per square yard for CHR-3P, and nine hundredths (0.09) plus or minus one hundredth (0.01) of a gallon per square yard for CSS-1h with the exact application rate as determined by the City Engineer in the field.

All manhole lids, water valve boxes and all other castings in the street shall be covered with heavy building paper securely held in place by methods approved by the City Engineer. All curbs and gutters, guardrails, street signs and other facilities shall be protected from splashing of the asphalt.

A strip of building material paper at least three (3) feet in width and with a length at least equal to that of the spray bar of the distributor plus one (1) 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. The Contractor at his expense shall correct any skipped areas or deficiencies. Junctions of spreads shall be carefully made to assure a smooth riding surface. The distribution of asphalt shall not vary by more than fifteen (15) percent transversely from the average, nor more than ten (10) percent longitudinally from the specified rate of application as determined by Idaho T-80. At the option of the City Engineer, distributors may be pre-qualified each season.

The length of spread of asphalt shall not be in excess of that which trucks loaded with cover coat material can immediately cover. The spread of asphalt shall not be more than six (6) inches wider than the width covered by the cover coat material from the spreading device. Under no circumstances shall operations proceed in such manner that the asphalt will be allowed to chill, set-up, dry or otherwise impair retention of the cover coat material. The distributor, when not spreading, shall be parked so that the spray bar or mechanism will not drip on the surface.

305.06.5 - Application of Cover Coat Material

Immediately following the application of the asphalt, cover coat material shall be spread. Unless otherwise specified in writing, cover coat material shall be spread at a coverage of approximately thirty (30) pounds per square yard, with the exact application rate as determined by the City Engineer in the field. Spreading shall be accomplished in such a manner that the tires of the trucks or aggregate spreader at no time contact the uncovered asphalt. If directed by the City Engineer, the cover coat material shall be moistened with water to eliminate or reduce the dust coating of the aggregate.

Immediately after the cover coat material is spread, deficient areas shall be covered by additional material. Rolling shall begin immediately behind the spreader and shall be continued until four (4) complete coverages are obtained. The rollers shall not be operated at a speed in excess of eight (8) miles per hour for the first coverage nor in excess of sixteen (16) miles per hour for subsequent coverages. Any roller speed which displaces or turns cover coat material shall be reduced. Rolling shall be completed the same day the seal coat is applied.

After the application of the seal coat, the Contractor shall maintain the surface until such time as he has completed the pick-up of the excess chips. Maintenance of the surface shall include the distribution of approved reject material over the surface as directed to absorb any free asphalt. The maintenance shall be conducted in a manner that will not displace embedded material.

The surface shall be swept when ordered. The Contractor shall completely remove all excess cover coat material from the entire surface width of all streets sealed and from all lawns, sidewalks, driveways, utility strips, etc. where it may have been thrown or deposited. This clean-up work shall be accomplished by means of a rotary power broom and/or other approved methods as may be required and shall be completed within no more than seven (7) days after the actual seal coat work is finished. The broom shall be in good condition and capable of sweeping a path at least seventy (70) inches wide without loosening or displacing embedded materials.

Where brooming operations could create dust to the extent that it would violate air pollution regulations or create a safety hazard, the surface of the

roadway to be swept shall be lightly sprayed with enough water to prevent dust from becoming air borne.

305.06.6 - Application of Fog Seal

When a fog seal is required, the existing surface shall be thoroughly cleaned prior to its application. For fog seal over a newly placed seal coat, all loose cover coat material shall be removed prior to application of the fog seal. Unless otherwise specified the fog seal shall be CSS-1h applied at the rate specified in Subsection 305.06.4 of these Standard Specifications.

305.07 - Asphalt Plantmix Pavement

This work shall consist of constructing one (1) or more courses of asphalt plantmix pavement in accordance with these Specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the Plans and as established by the City Engineer.

Unless otherwise specified, the Contractor shall furnish all asphalt and mineral aggregates, mineral filler, anti-stripping agent and blending sand as may be required and perform all mixing, hauling, spreading, compacting and other work necessary to complete the asphalt plantmix pavement in accordance with these Specifications. Materials shall be accepted at the job site upon proof of satisfactory compliance.

The Asphalt cement content shall be within plus or minus zero point four (0.4) percent of the target amount as determined by AASHTO TP53.

Unless otherwise specified in the Special Provisions and / or the Plans the asphalt cement grade shall be PG 58-28. Anti-Stripping Additive shall be added to the Asphalt Cement as specified in Subsection 301.02 of these Standard Specifications at no additional cost to the City.

305.07.1 - Mix Design Approval

The Contractor shall submit a proposed mix design to the City Engineer for approval prior to the start of any asphalt plantmix paving work. Pre-qualified mix designs from an independent testing laboratory showing the minimum requirements meeting these sections of the Standard Specifications shall be acceptable for use. Any costs associated with these proposed mix designs shall be at the Contractor's expense.

The asphalt content specified from the mix design shall produce a mixture with the characteristics shown in the table below:

Characteristic	Requirement
Voids in Total Mix	3% to 6%
Voids in Mineral Aggregate	10% minimum
Hveem Stability	32 minimum
Film Thickness	6 microns minimum

All characteristics shown in the table above shall be determined in accordance with the test methods specified in Subsection 304.02 of these Standard Specifications. Prior to placing any asphalt plantmix, the asphalt content shall be approved by the City Engineer.

The use of R.A.C. (Recycled Asphalt Concrete) in the proposed mix design for asphalt plantmix is acceptable provided the mixture meets specification requirements.

305.07.2 - Mixing

The aggregate and asphalt shall be mixed sufficiently to provide not less than ninety-five (95) percent coating when tested in accordance with Idaho T-96. Unless otherwise specified, the asphalt content shall not be less than that of the approved mix design. The moisture content of the mixture at the time of placement shall not exceed one (1) percent.

Mixtures produced in batch mixers or continuous mixing plants, except for thin pavement courses shall be produced at a temperature that will provide an asphalt viscosity within the range as determined from temperature viscosity curves for the particular type of asphalt being used. Mixtures for thin pavement courses, fifteen hundredths (0.15) of a foot or less in thickness, shall be produced at the lowest temperature that will produce a uniform workable mixture not exceeding three hundred and ten (310°) degrees Fahrenheit and permit rolling to be completed within the proper temperature range.

Mixtures produced in a dryer-drum shall be discharged at a temperature not to exceed two hundred and ninety (290°) degrees Fahrenheit. The mixing temperature shall be adjusted as directed in accordance with the grade of asphalt and construction conditions.

Mineral Filler and Fly Ash shall be incorporated in the mix at the rate shown on the Plans and / or in the Special Provisions.

305.07.3 - Equipment

The Contractor shall be required to have at least two (2) rollers in operation on each project. Both rollers shall be a vibratory smooth drum. All rollers shall be in good condition and the reversing mechanism so maintained that the roller is capable of changing directions smoothly. Additional rollers shall be furnished and operated by the Contractor, if in the opinion of the City Engineer, they are necessary to compact the pavement mixture satisfactorily. Competent and experienced personnel shall operate rollers.

305.07.4 - Weather Limitations

Plantmix shall not be placed on a wet or frozen surface, when weather or surface conditions otherwise prevent the proper handling or finishing of the plantmix material or when the air temperature is below thirty-five (35°F) degrees Fahrenheit or when the surface temperature is less than forty (40°F) degrees Fahrenheit.

305.07.5 - Preparation of Surface

When the surface of the existing pavement or old base is irregular, it shall be brought to a uniform grade and cross section with plantmix leveling course as directed by the City Engineer. Surfaces of curbs, gutters, manholes, Portland Cement pavement and other structures shall be painted with a thin, uniform coat of emulsified asphalt (Tack Coat) prior to pavement being placed against them.

305.07.6 - Spreading and Finishing

If the total compacted thickness is equal to or more than three-tenths (0.3) foot, it shall be placed in two (2) or more individual layers or lifts of nearly equivalent thickness. The mixture shall be laid upon an approved surface. Pavers shall be used to distribute the mixture either over the entire width or over such partial width as may be practicable. Unless otherwise directed, partial width paving shall not extend beyond one (1) day's production.

The paving machine shall be a type and design approved by the City Engineer. It shall be operated in such a manner as to distribute the mixture to the proper cross section width and thickness without segregation of aggregates. The spreading mechanism of the machine shall leave the mixture uniformly dense throughout, smooth and free from inequalities and irregularities. Any failure of the machine to produce a smooth and uniform spread of the mixture shall be corrected immediately to the satisfaction of the City Engineer. The forward motion of the paving machine shall be regulated so that no irregularities in the pavement surface are caused by the excessive forward speed of the machine. The forward speed shall be adjusted to that speed which obtains the best results for the particular paving machine being used.

The rate of placement of the paving mixture shall be uniform and shall be coordinated with the rate of production from the mixing plant so that excessively intermittent operation of the spreading machine is eliminated.

Provisions must be made for breaking up any particularly compressed or consolidated masses of paving materials after such are discharged from the truck. Any small, segregated or nonuniform pavement surface areas shall be immediately corrected by hand methods, whereby the larger aggregate particles are raked off and wasted and the finer portions of the mix are deposited or raked onto the segregated area in such quantity and manner that its nonuniform condition is eliminated.

Segregated or coarse material shall neither be allowed to collect nor be deposited in areas adjacent to the vertical faces of metal castings, existing pavements and curb and gutters, etc. All such segregated material shall not only be removed and wasted, but it shall also be replaced with acceptable material prior to compaction.

Areas that are inaccessible to the paving machine may be paved by other methods as approved by the City Engineer. When required by the City Engineer, motor patrol graders or approved types of truck-attached spreaders shall be used to pave inaccessible or irregularly shaped areas. Hand raking shall be kept to a minimum. Workmen shall not be allowed to walk or stand on the finished mixture before it has been rolled.

A thirty (30) foot ski or sonic sensor shall be used for grade control on both sides of the paving machine. A matching shoe will not be allowed for screed grade control. The Contractor may use other means of automatic grade control, provided they are approved by the City Engineer. Cross slope grade control will not be allowed. If necessary, the City will provide finish grade elevations at the gutter lip or flow line on twenty-five (25) foot intervals for wire lines or laser grade control. The above grade control requirement shall only apply to the final lift (wearing course). Additional handwork may be necessary along the lip of gutter to provide a good match.

The Contractor shall insure that the finished pavement is uniform. If in the opinion of the City Engineer there is excessive segregation of the mixture the Contractor shall provide a written description of corrective action to be taken. There shall be no paving until the corrective action has been approved by the City Engineer and has been implemented. Based upon previous projects it may be necessary to maintain a minimum amount of material in the lay down machine hopper and to reject a portion of the material in the haul trucks in order to avoid excessive segregation of the plantmix.

305.07.7 - Joints

Placing of the plantmix 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. A brush coat of SS-1 Emulsified Asphalt shall be used on contact surfaces of transverse joints and cold longitudinal joints just before additional new hot asphalt mixture is placed against the previously rolled material.

All joints shall be properly raked to maintain the specified cross section. The coarse and/or excess materials shall not be pushed or thrown onto the surface of the asphalt being placed. Such coarse or excess material shall be raked aside and gathered up by hand shovels and deposited ahead of the paving machine or wasted as directed by the City Engineer.

Only one (1) cold longitudinal joint will be allowed. On the top course, it shall be at the centerline of the traveled way. On the lower courses, it shall be staggered and offset six (6) inches to one (1) foot from the centerline of the traveled way. A cold joint is defined as any joint where the previously laid material that is to be abutted has lowered to a temperature of one hundred seventy-five (175°) degrees Fahrenheit or less.

305.07.8 - Compaction

The plantmix shall be compacted as quickly as possible after placing. Initial or "Breakdown" rolling shall follow the paver as closely as possible and shall be accomplished with either type of smooth-wheel roller. Intermediate rolling shall follow immediately behind the breakdown rolling. All breakdown and intermediate compaction shall be performed while the mixture temperature is above one hundred and eighty (180) degrees Fahrenheit. Finish rolling shall be performed at as high a temperature as is practicable and shall eliminate marks from previous rolling. The pavement shall be compacted to a minimum of ninety-two (92) percent of Maximum Theoretical Density, in accordance with AASHTO T166, T209, T269, and T275. Pavement density testing will be done using a nuclear gage with the readings corrected in accordance with WAQTC TM-8.

Unless otherwise directed, rolling shall begin at the sides and proceed longitudinally parallel to the street centerline with each trip overlapping one-half (1/2) the roller width. When paving in echelon or abutting a previously placed lane, the longitudinal joint shall be rolled first, followed by the regular rolling procedure. On super-elevated curves, the rolling shall begin on the low side and progress to the high side by overlapping of the longitudinal trips parallel to the centerline.

The roller shall be kept in continuous motion while on the hot asphalt plantmix mat in such a manner that all parts of the pavement receive equal

compression. Rollers shall be operated at speeds slow enough to avoid displacement of the pavement or excessive crushing of the aggregate. Care shall be exercised in rolling so as not to displace the line and grade of the edges of the pavement. Any displacement occurring as a result of reversing the direction of the roller or from any other cause shall be corrected immediately by the use of rakes and fresh asphalt plantmix material when required. To prevent adhesion of the mixture to the roller, the wheel shall be kept properly moistened, but excess water will not be permitted.

The surface of the mixture after compaction shall be smooth and true to the established section and grade. Any mixture which shows an excess of deficiency of asphalt or uneven distribution of asphalt due to insufficient mixing or which becomes loose, broken, raveled, mixed with dirt or is in any way defective shall be removed and replaced with fresh, hot asphalt plantmix material at the Contractor's expense and shall be immediately compacted to conform with the surrounding area. Areas of one (1) square foot or more showing an excess or deficiency of asphalt shall be removed and replaced.

Along forms, curbs, headers, walls and other places not accessible to rollers, the mixture shall be thoroughly compacted with mechanical tampers or other approved compactors. All of the mixture shall be removed from the gutter surface prior to rolling. The finished surface of the asphalt material shall be one-quarter (1/4) inch above the lip of the adjacent gutter or top of curb as shown on the Plans or the Standard Drawings and shall be thoroughly compacted throughout the entire depth of the mixture adjacent to the vertical face of the gutter lip, curb or other joint material.

305.07.9 - Surface Smoothness

The completed surface will be examined with a ten (10) foot straightedge, at locations to be determined. When the straightedge is laid on finished pavement in a direction parallel with centerline or perpendicular to centerline, the surface shall not vary more than one-quarter (1/4) inch from the lower edge. Miscellaneous pavements shall not vary more than one-half (1/2) inch.

305.08 - Pavement Section

When shown on the Plans or required in the Specifications, Pavement Sections shall be defined as all work to shape and compact the subgrade, to furnish, install, shape and compact the aggregate base material, to furnish, install and compact the asphalt plantmix pavement to the required specified depths. All material and work shall be done in accordance with this Section and of the Section on EARTHWORK AND BASES of the Standard Specifications. All compaction shall be CLASS "A" COMPACTION unless otherwise specified.

305.08.1 - Miscellaneous Section

This work shall be defined as those irregular or confined areas such as raised or depressed islands or medians, driveway approaches, utility strips, areas behind sidewalk and approaches, and in parking lots which require the installation of asphalt plantmix pavement. It is the intent of this section that the methods and equipment being used for the major paving operations in the area will not work in these areas. Pavement width transitions or tapers shall not be included under this item. Only those areas shown on the Plans as "Miscellaneous Section" shall be included in this item.

305.09 - Pathway

This work shall consist of the Contractor supplying all materials, labor and equipment necessary to construct a pathway consisting of plantmix pavement and aggregate base to the designated width, as shown in the Plans, as specified and as directed by the City Engineer.

Dual use pedestrian bicycle pathways shall be a minimum of ten (10) feet in width and preferably be twelve (12) feet in width.

Constructing the Pathway shall consist of clearing and grubbing, grading, placing aggregate base and plantmix as shown in the Plans, as specified, and as directed by the City Engineer.

Aggregate base and plantmix pavement shall comply with City Standard Specifications. Plantmix pavement shall consist of conventional plantmix pavement aggregate as designated in Section 301.06.1. Subgrade separation geotextile fabric used shall meet the requirements of Section 201.01. PG 58-28 asphalt shall be used in Pathway plantmix pavement.

Completed Pathway shall consist of a minimum of two (2) inches of plantmix pavement and six (6) inches of aggregate base to the designated width as shown in the Plans.

Unless otherwise shown in the typical section, geotextile fabric shall be installed beneath the crushed aggregate base. If no separate payment item is established for geotextile fabric it shall be considered incidental to the Pathway pat item.

309 - MEASUREMENT AND PAYMENT

309.01 - Prime Coat

309.01.1 - Measurement

Asphalt for prime coat shall be measured on a TON basis. Blotter material shall not be measured.

309.01.2 - Payment

The various types and grades of liquid asphalt for prime coat shall be paid at the Contract unit price bid on a TON basis. If there is no separate item for asphalt for prime coat, all costs associated with furnishing and placing the prime coat material shall be considered as subsidiary work and all costs thereof shall be included in the unit bid price for other items related to this work.

Blotter material will not be paid for separately and all costs associated therewith shall be included in the cost of other related bid items. There shall also be no separate compensation for keeping the prime coat in suitable repair and all costs associated therewith shall be included in the cost of other related bid items.

309.02 - Tack Coat

309.02.1 - Measurement

Liquid Asphalt and Asphalt Cements for tack coat shall be measured on a TON or GALLON basis with a correction for temperature. Diluted emulsified asphalt shall be measured on a GALLON basis with no correction for temperature.

309.02.2 - Payment

The various types and grades of Liquid Asphalt and Asphalt Cements for tack coat shall be paid at the Contract unit price bid on a TON or GALLON basis. If there is no separate item for asphalt tack coat, all costs associated with this item shall be included in the various unit bid prices for other items.

The various types and grades of Emulsified Asphalt for tack coat shall be paid at the Contract unit price bid on a GALLON basis. If there is no separate item for asphalt tack coat, all costs associated with this item shall be included in the various unit bid prices for other items.

309.03 - Seal Coat

309.03.1 - Measurement

Seal coat shall be measured on a SQUARE YARD basis of the street surface actually covered by the seal coating.

309.03.2 - Payment

Seal coat shall be paid at the Contract unit price bid on a SQUARE YARD basis complete and in place. The payment shall be full compensation for all asphaltic materials, including anti-strip additives, cover coat material, blotter material and any and all other materials, labor and equipment needed to complete the work and shall further include such incidental expenses as are associated with traffic control, flaggers, signing, chip clean-up, etc.

309.04 - Paving Fabric

309.04.1 - Measurement

Paving fabric shall be measured on a SQUARE YARD basis of the actual surface covered by the fabric. Overlaps for splices will not be paid. In lieu of measuring the fabric in place, the City Engineer may measure the area of the surface treatment installed over the fabric and deduct for any setback requirements as required by the Contract.

309.04.2 - Payment

Paving fabric shall be paid at the Contract unit price bid on a SQUARE YARD basis. The payment shall be full compensation for all labor, materials and equipment necessary to install the paving fabric complete and in place. Unless a separate item is included in the Contract, the cost of the tack coat shall be included in the cost of this item.

309.05 - Asphalt Plantmix Pavement

309.05.1 - Measurement

The various thicknesses of asphalt plantmix pavement and miscellaneous pavement shall be measured on a SQUARE YARD basis. The thickness designation of the pavement shall be based upon its total compacted depth and shall be irrespective of the number of individual layers or lifts that may be required. If the depth of the pavement is not specifically shown on the Plans or specified in the Proposal, it is herewith designated as having a compacted thickness of two (2) inches.

The various thicknesses of asphalt plantmix pavement used for leveling courses and overlays shall be measured on a TON basis. The measurement

shall be irrespective of the actual thickness the leveling course or overlay comprises.

309.05.2 - Payment for Asphalt Plantmix Pavement

The various thicknesses of Asphalt Plantmix Pavement shall be paid at the Contract unit price bid on a SQUARE YARD basis. The payment shall be considered as full compensation for any and all costs for materials, equipment or labor necessary to complete the work. No separate payment will be made for the asphalt cement or anti-stripping agent (if required) used in the asphalt plantmix material or for the asphalt tack coat between lifts, if necessary.

309.05.3 - Payment for Asphalt Plantmix Pavement for a Leveling Course

The various thicknesses of Asphalt Plantmix Pavement for a Leveling Course shall be paid at the Contract unit price bid on a TON basis. The payment shall be considered as full compensation for any and all costs for materials, equipment or labor necessary to complete the work. No separate payment will be made for the asphalt cement or anti-stripping agent (if required) used in the asphalt plantmix material.

309.05.4 - Payment for Asphalt Plantmix Pavement for an Overlay

The various thicknesses of Asphalt Plantmix Pavement for an Overlay shall be paid at the Contract unit price bid on a TON basis. The payment shall be considered as full compensation for any and all costs for materials, equipment or labor necessary to complete the work. No separate payment will be made for the asphalt cement or anti-stripping agent (if required) used in the asphalt plantmix material.

309.06 - Street Section

309.06.1 - Measurement

The various thicknesses of asphalt plantmix pavement and aggregate base material for Street Section shall be measured on a SQUARE YARD basis. The thickness designation of the pavements and aggregate base courses shall be based upon their total compacted depth and shall be irrespective of the number of individual layers or lifts that may be required. If the depths of the pavement and aggregate base course are not specifically shown on the Plans or specified in the Proposal, it is herewith designated that the compacted thickness of the pavement shall be two (2) inches and that of the aggregate base shall be six (6) inches.

309.06.2 - Payment for Street Section

The various thicknesses of asphalt plantmix pavement and aggregate base material for Street Section shall be paid at the Contract unit price bid on a SQUARE YARD basis. The payment shall be considered as full compensation for any and all costs for materials, equipment or labor necessary to complete the work. No separate payment will be made for the asphalt cement or anti-stripping agent (if required) used in the asphalt plantmix material or for the asphalt tack coat between lifts, if necessary.

309.06.3 - Payment for Miscellaneous Section

The various thicknesses of Miscellaneous Section shall be paid at the Contract unit price bid on a SQUARE YARD basis. The payment shall be considered as full compensation for any and all costs for materials, equipment or labor necessary to complete the work. No separate payment will be made for the asphalt cement or anti-stripping agent (if required) used in the asphalt plantmix material or for the asphalt tack coat between lifts, if necessary.

All excavation shall be measured and paid for separately under the Section Earthwork and Bases of the Standard Specifications. The removal of asphalt surfacing shall be measured and paid for separately under Removal of Pavement if defined; otherwise, it shall be paid as excavation.

309.07 - Pathway

309.07.1 - Measurement

The various widths of Pathway shall be measured on a LINEAR FOOT basis along the center line of the Pathway. The compacted thickness of the pavement shall be at least two (2) inches and that of the aggregate base shall be at least six (6) inches.

309.07.2 - Payment

The various widths of Pathway shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be considered as full compensation for any and all costs for materials, equipment or labor necessary to complete the work. No separate payment will be made for clearing and grubbing, grading, geotextile, plantmix pavement or aggregate base.

**CITY OF IDAHO FALLS
PUBLIC WORKS DIVISION
ENGINEERING DEPARTMENT**

**STANDARD SPECIFICATIONS
FOR
CONSTRUCTION
INCIDENTAL CONSTRUCTION
SECTION 400**

2010 EDITION

**STANDARD SPECIFICATIONS FOR CONSTRUCTION
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400 - SUBINTRODUCTION

Incidental Construction shall consist of all the miscellaneous work items that may be required to complete the construction of various public works projects. All materials, workmanship and installation procedures shall be done in accordance with these Standard Specifications and in reasonably close conformity with the lines and grades shown on the Plans and as directed by the City Engineer.

401 - MATERIALS

401.01 - Chain Link Fence

All material shall be heavily hot dip galvanized after fabrication and shall meet the requirements and be in conformance with AASHTO M 181 and ASTM A 153. All concrete shall conform to the City of Idaho Falls Standard Specifications for Portland Cement Concrete, Class 4.

401.01.1 - Fence Fabric

The chain link fence material shall be a minimum of No. nine (9) gauge, two (2) inch mesh and shall be "Galv-After" as manufactured by Cyclone Fence, or equal. The fabric shall have one selvage edge knuckled and one edge twisted and barbed. The fabric shall meet the requirements of ASTM A 392, Class I.

401.01.2 - Posts, Rails, Braces, Bars and Clips

Fence posts, post tops and extensions, rails, braces, stretcher bars, and clips shall be of zinc-coated steel.

401.01.3 - Wire Fabric Ties

Wire fabric ties shall be hog rings, aluminum wire, or galvanized steel wire not less than nine (9) gauge.

401.01.4 - Tension Wire

The tension wire shall be seven (7) gauge coiled spring wire coated similarly to the respective wire fabric being used.

401.01.5 - Miscellaneous Fittings

Miscellaneous steel fittings and hardware shall be of commercial grade steel or better quality, wrought or cast as appropriate to the article, and sufficient in strength to provide a balanced design when used in conjunction with fabric, posts and wires of the quality specified herein.

401.01.6 - Gates

Gates shall be constructed of the same material as the fence and shall conform to the same requirements as fence materials.

401.01.7 - Vinyl Slats

Specifications for Vinyl Slats shall be submitted to the City Engineer. The City Engineer shall approve the specifications in writing prior to the start of construction.

401.02 - Traffic Control Devices

All concrete shall conform to the City of Idaho Falls Standard Specifications for Portland Cement Concrete, Class 4.

401.02.1 - Signs

Traffic signs shall be of the correct size, shape, and color for the standard sign as shown on the Standard Drawings and in accordance with the M.U.T.C.D. Sign faces shall be a minimum of engineer grade reflective sheeting on eight-hundredths (0.08) of an inch alodine 1200 finish aluminum. Reflective sheeting shall conform to the current U.S. Department of Transportation, Federal Highway Administration's "Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects". Fabrication of the reflective sheeting shall be applied on aluminum as required in accordance with the manufacturer's recommendations and in such a manner that no background material will be visible when the sign is assembled. Splicing of reflectorized sheeting will not be permitted. Cracks, discoloration, appearance of air pockets, or any other indication of non-adherence in the sheeting will not be accepted. Direct applied cutout reflective sheeting legends, borders and symbols shall be cut with a smooth regular outline, free from ragged or torn edges. Letters, numerals and symbols having interior or exterior rounded corners shall be cut with a smooth three sixteenth (3/16) inch plus or minus one sixteenth (1/16) inch radius. Holes shall be punched through the aluminum sign plates in a manner that shall not allow for sharp or irregular edges. The manufacturer shall punch holes in accordance to the standard for the size, shape, and type of sign shown. Aluminum sign plates shall be free of any waves, bumps, or irregularities. Sign edges of the reflective sheeting shall be sealed in conformance with the methods specified by the reflective sheeting manufacturer.

401.02.2 - Hardware

Bolts, nuts, washers, and other hardware items used for fabrication and installation of ground mounted signs shall be cadmium plated steel, or aluminum. Signs mounted to metal poles shall be mounted using three-quarter (3/4) inch stainless steel band with a minimum thickness of three hundredths (0.03) of an inch and shall use stainless steel buckles, brackets, bolts, washers and fiber washers as instructed by the manufacturer. Street name sign hardware shall consist of precast aluminum extruded two (2) inch caps and ninety (90) degree crosspiece assemblies.

401.02.3 - Steel Sign Supports

City of Idaho Falls Standard Sign Post shall be a Type E post. Steel shall conform to ASTM A 53, Types E and S - Grade B, or ASTM A 446 - Grade A. The thickness shall be twelve (12) gauge (0.105 USS Gauge). Structural steel for steel brace angles and brackets shall conform to ASTM A 36. High strength

bolts, nuts, and washers for all sign posts shall conform to ASTM A 325. Anchor bolts shall conform to AISI 1144. Nuts and washers for anchor bolts shall conform to ASTM A 325. Signposts and sleeves shall be free from cutting oils, and sharp edges. Posts and sleeves shall be zinc galvanized to prevent rust and posts shall be perforated on all four sides. Signs larger than thirty (30) inches in width shall be supported by one-quarter (1/4) inch by one-half (1/2) inch by variable length galvanized flat steel supports. Supports shall be welded and bolted to the signposts.

401.02.4 - Paint

Pavement marking paint shall be "Waterborne - Based" unless otherwise noted. All pavement marking paint shall conform to Federal Paint Specification TT-P-115, Type II, Fast Drying and the Current Idaho Transportation Department Specification. All pavement marking paint shall be lead and chromium free in accordance with ASTM D3335 and found to have a total lead concentration less than 0.6%.

401.02.5 - Glass Beads

The glass beads for traffic line paint shall conform to Federal Specification TT-B-1325 Glass Spheres Retro-Reflective, Type I (Low Index of Refraction and the current Idaho Transportation Department Specification. All beads shall have dual chemical coatings to provide both anti-wetting and adherence properties.

401.02.6 - Pre-formed Thermoplastic Pavement Markings

All Thermoplastic Pavement marking materials shall be heat fused permanent pre-formed thermoplastic. All material shall be 125 mil thickness and shall conform to the latest version of AASHTO M 249 standard specification.

401.03 - Sprinkler System

All materials used for sprinkler systems shall be available in Idaho Falls for future maintenance requirements. All sources of material supply shall be verified prior to bidding. Failure to do so will not relieve the Contractor from his responsibility for furnishing and installing all the materials in strict accordance with these requirements at the locations as shown on the Plans or as directed by the City Engineer and without additional expense to the owner.

Main line pipes shall be two (2) inch, one and one-half (1½) inch, one and one-quarter (1 ¼) inch, or one (1) inch pipe. Do not use damaged or kinked pipe. Multiple lines installed in the same trench shall be at the same elevation with a minimum of twelve (12) inches horizontal spacing. Lines shall be installed with minimal elevation changes. All lines under asphalt or concrete shall be installed in at least four (4) inch Schedule 40 PVC sleeve without bends or fittings. Larger

size sleeves may be utilized as needed. All ends of sleeves shall be sealed with an expandable sealant.

All main lines shall be Schedule 40 PVC pipe. All main lines shall only be reduced and pipe material changed at the connection to the galvanized service line. Main lines shall be installed with appropriately sized master valves placed immediately downstream from the back flow device and shall include proper wiring. All main lines shall be installed with Schedule 40 sensor body and IMMS Flow-Click as per design with appropriate wire sizing and valve box.

All wiring of lengths of less than one-thousand (1,000) feet when measured from the controller shall be 18 gauge braided. Wire over one-thousand (1,000) shall consist of 14 gauge single strand.

All lateral lines shall be approved Polyethylene pipe. All lateral lines shall only be reduced or pipe material changed at the connection to the electric valve, unless the lateral line is less than two (2) inches in which case the line may be reduced in the last one-hundred (100) feet of run length.

All connections of cut polyethylene pipe shall have barbed insert fittings and stainless steel clamps as shown in the Standard Drawing.

Sprinkler heads in a continuous lateral line shall be installed using brass or plastic saddles. Sprinklers at the end of lateral lines shall be installed with a barbed insert elbow with a stainless steel clamp.

Heads shall be installed using linear low-density polyethylene pipe with barbed elbows. Heads shall be installed perpendicular to finish grade in accordance with the typical detail shown on the Plans and at the proper locations as designed. Rigid "Swing Joint" connections shall not be allowed. Those heads immediately adjacent to sidewalks, curbs, asphalt, fence or buildings shall be installed one and one-half to two (1 1/2 - 2) inches below top of sidewalk, curb or asphalt and have maximum six (6) inches horizontal clearance between head and any of the above mentioned objects.

401.04 - Geogrid

Geogrid shall be a regular grid structure formed by uniaxially drawing a continuous sheet of select high density polyethylene material and shall have aperture geometry and rib and junction cross-sections sufficient to permit significant mechanical interlock with the material being reinforced. The geogrid shall have high flexural rigidity and high tensile strength through all ribs and junctions of the grid structure. The geogrid shall have high resistance to deformation under sustained long-term design load while in service and shall also be resistant to ultraviolet degradation, to damage under normal construction practices and to all forms of biological or chemical degradation normally encountered in the material being reinforced.

The geogrid shall also conform in all respects to the property requirements listed in the table below:

Property	Test Method	Value
Dynamic Load Capacity		
True tensile strength @ 2% strain	GRI-GG1	1010 lb/ft Minimum
True tensile strength @ 5% strain	GRI-GG1	1920 lb/ft Minimum
Sustained Load Capacity		
True initial modulus	GRI-GG1	129.2 X 1000 lb/ft Minimum
Structural Integrity		
Junction Strength	GRI-GG2	3480 lb/ft Minimum
Flexural Stiffness	ASTM D 1388	670 X 1000 mg-cm Minimum
Durability		
Resistance to installation damage in 2" max size crushed stone Soil Class GP.	ASTM D 5818	69% Minimum Strength Retained
Resistance to degradation when exposed to pH 2-13	EPA 9090 Submersi on Testing	100% Minimum Strength Retained
Values shown above are minimum average roll values determined in accordance with ASTM D - 4759		

401.05 - Modular Block Retaining Wall Units

Modular concrete retaining wall units shall be in accordance with ASTM C-90 and ASTM C-140.

Modular concrete units shall conform to the following Architectural Requirements:

1. Face color shall be Grey or custom color as specified in the Plans, Special Provision, or as directed by the City Engineer.
2. Face finish shall be sculptured rock face or as specified in the Plans, Special Provision, or as directed by the City Engineer.
3. Surfaces of units shall be free of chips, cracks or other imperfections.

Modular concrete units shall conform to the following structural and geometric requirements:

1. Compressive strength shall be three thousand (3000) pounds per square inch minimum.
2. Absorption shall be eight (8) percent maximum for standard weight aggregate.
3. Inter-unit shear strength shall be four hundred (400) pounds per lineal foot minimum at two (2) pounds per square inch normal pressure.
4. Geogrid unit peak connection strength shall be six-hundred (600) pounds per lineal foot minimum at two (2) pounds per square inch normal force.
5. Maximum horizontal gap between erected units shall be one-half (1/2) inch.

Modular concrete units shall conform to the following constructability requirements:

1. The slope of the vertical wall face shall be as denoted in the Standard Drawings or as suggested by the manufacturer.
2. Units shall be capable of being placed in both concave and convex alignment curves with a minimum radius of four (4) feet.

401.06 - Landscaping Materials

401.06.1 - Trees

The Contractor shall provide all materials to complete the installation as shown on the Plans or as directed by the City Engineer. Substitutions shall not be accepted unless approved in writing by the City Engineer. If specialized landscape material is not obtainable, submit to the City Engineer proof of no availability and proposal for use of equivalent material.

Plant materials shall be true to name and variety established by the American Joint Committee on Horticultural Nomenclature "Standardized Plant Names," Second Edition, 1942. The trees shall comply with the recommendations and requirements of ANSI Z60.1 "Standard for Nursery Stock" and as further specified. Trees shall conform to state and federal laws relating to inspection for diseases and insect infestation, and shall conform to the American Standard for Nursery stock. Trees shall be first class representatives of their species or variety.

Trees shall be grown in a recognized nursery in accordance with good horticultural practice. Provide healthy, vigorous stock grown under climatic conditions similar to conditions in the locality of the project and free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions, or disfigurement. Trees shall have well-developed root systems.

Trees shall be of the sizes shown or specified in the Plans or Special Provisions. Caliper of trees shall be measured at a distance of twelve (12) inches above ground level. Trees of larger size may be used if acceptable to the City Engineer, and if sizes of roots or balls are increased proportionately. Use of such trees shall not increase the contract price.

The City Engineer reserves the right to inspect trees, either at place of growth or at site before planting, for compliance with requirements for name, variety, size, and quality. Upon completion of the work and prior to the final acceptance, invoice or written statements from the suppliers showing the name of materials received or shipped, shall be presented to the City Engineer for a final check as to conformance to these specifications.

Do not use freshly dug trees or trees which have been in cold storage or heeled-in. Do not prune prior to delivery. Do not bend or bind-tie trees in such a manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery.

Deliver trees after preparations for planting have been completed and plant immediately. If planting is delayed more than six (6) hours after delivery, set trees on the ground in shade, protect from weather and mechanical damage, and keep roots moist by protecting them with soil, wet peat moss, wet sawdust, or wet ground bark. Do not remove container-grown stock from containers until planting time. The Contractor shall label at least one (1) tree in each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

Tree height and caliper shall be as listed in the Plans and/or special provisions and with branching configuration recommended by ANSI Z60.1 for type and species required. Provide single stem trees except where special forms are shown or listed. Balled and burlapped trees shall be contained in firm natural balls of earth, of sufficient diameter and depth to include all fibrous and feeding roots. Trees in which the ball has been broken or cracked either before or during operations will not be accepted.

401.06.2 - Fertilizer for Trees

Commercial fertilizer shall be of neutral character, with some elements derived from organic sources and containing not less than ten (10) percent available phosphoric acid and twenty (20) percent total nitrogen and from three (3) percent to five (5) percent soluble potash.

401.06.3 - Planting Mulch

Planting mulch shall be ground fir, spruce or hemlock, free from weed seeds, tannin, or other compounds detrimental to tree life. Mulch shall have a size range of one-quarter to one ($\frac{1}{4}$ to 1) inch, with a maximum of fifty (50) percent passing a one-half ($\frac{1}{2}$) inch screen.

401.06.4 - Grass Sod

Grass sod shall consist of Merion, Park, Delta or Windsor Kentucky Bluegrass, or combinations of approved fine textured grasses suitable for the area designated for sod. Grasses shall be true to type and name in accordance with the Standard Plant Names, current edition, by the Editorial Committee of the American Joint Committee on Horticultural Nomenclature. Grass sod to be furnished shall not be less than ten months old and shall have prior approval at the supply source before cutting for delivery to the planting site. Sod showing evidence of improper handling or discoloration due to prolonged storage prior to delivery and placement shall be rejected.

401.06.5 - Grass Sod Fertilizer

Grass Sod Fertilizer shall be of neutral character, with some elements derived from organic sources and containing a percentage of nitrogen required to provide not less than fifteen (15) pounds of actual nitrogen per one-thousand (1,000) square feet of lawn area and not less than four (4) percent phosphoric acid and two (2) percent potassium. Nitrogen shall be in a form that will be available to lawn during initial period of growth; at least fifty (50) percent nitrogen to be organic form.

401.07 - Drain Rock

Drain rock shall be durable, sound, hard stones from an approved source. The drain rock shall meet the gradation requirements shown in the table below when tested in accordance with AASHTO T27:

Sieve Sizes	Percent Passing
6 - Inch	100
No. 4	0 - 10
No. 200	0 - 5

401.08 - Riprap

Riprap shall be durable, angular field or quarry stones of approved quality, sound, hard, and from an approved source. The grading of the riprap shall be determined by visual inspection of the material before it is placed. The stone shall be nearly rectangular, approximately fifty (50) percent having a volume

greater than one (1) cubic foot. The maximum size shall not exceed the depth of riprap specified on the Plans.

401.09 - Wood Fence

401.09.1 - Slats

Unless otherwise shown in the Plans, all wood slats shall consist of cedar at least four (4) inches wide and to the height shown in the Plans. If no height is designated in the Plans, the Contractor shall install a standard fence height of six (6) feet.

401.09.2 - Rails and Posts

Rails shall be sized to accommodate the spacing between posts and satisfy applicable wind loading requirements. Under no circumstances, will rails smaller than two by four (2 x 4) inches nominal be incorporated into the wood fence.

Posts incorporated into the fence shall consist of pressure treated redwood four by four (4 x 4) inches wide and deep. Posts shall be concreted firmly into place at least twenty-four (24) inches below natural ground.

401.09.3 - Miscellaneous Fittings

Miscellaneous steel fittings and hardware shall consist of galvanized steel and be sufficient in strength to provide a balanced design when used in conjunction with those materials specified herein.

401.10 - Silt Fence

401.10.1 - Silt Fence

Silt fence shall be constructed that is a minimum of three (3) feet wide geotextile securely fastened to posts. The geotextile shall be attached to the up-gradient side of the posts such that a six to eight (6 - 8) inch length of geotextile is left unattached at the bottom to be buried in soil. The silt fence shall be constructed to withstand the forces induced by sediment loading. All geotextile splices shall be sewn and consist of an eighteen (18) inch overlap sewn at each loose end of the fabric.

The geotextile shall be free of defects or flaws, which significantly affect its physical and /or filtering properties.

Posts shall be a minimum of four (4) feet long and pointed at one end. Wood or steel posts may be used. Maximum post spacing shall be as suggested by the manufacturer. Wood posts shall consist of two by four (2 x 4) inch nominal posts or as suggested by the manufacturer. Steel posts shall consist of any

standard shape with a minimal weight of three-quarter (3/4) pounds per linear foot.

The geotextile may be attached to the posts using geotextile pockets, hems with cord, staples or nails. Wire staples shall be a No. seventeen (17) gauge minimum and shall have a minimum three-quarter (3/4) inch wide crown and a half (1/2) inch long legs. Staples shall be evenly spaced with at least four (4) per post.

Woven/nonwoven geotextile meeting the following criteria is acceptable:

Geotextile Property	Test Method	Minimum Average Role Values
Grab Tensile Strength - N (lb) (In either direction)	ASTM D 4632	400 (90)
Grab Elongation (%)@ 50% of min. Tensile Strength 200 N (45 lb)	ASTM D 4632	50 max (1)
Permittivity (sec -1)	ASTM D 4491	0.05
Apparent Opening Size	ASTM D 4571 COE CW-002215	0.85 mm (#20) or finer
Ultraviolet (UV) Radiation Stability Retained	ASTM D 4355	70% Strength Retained @ 150 hours

401.11 - Casing Installation

401.11.1 - Casing Installation

Unless otherwise specified on the Plans, the size and wall thickness of the steel casing to accommodate the contract pipeline shall be as follows:

Steel Casing Wall Thickness Chart		
Minimum Thickness		Diameter of Casing Pipe
(Inches)	(Inches)	(Inches)
0.2500	1/4	12 or less
0.3125	5/16	> 12 - 18
0.3750	3/8	> 18 - 22
0.4375	7/16	> 22 - 28
0.5000	1/2	> 28 - 34
0.5625	9/16	> 34 - 42
0.6250	5/8	> 42 - 48

The steel casing diameter shall provide a minimum of two (2) inches of clearance between the inside of the steel casing and the outside dimension of the carrier pipe.

The Contractor shall weld sections of casings to be jacked/bored with a continuous circumferential weld and provide for stress transfer across the joints capable of resisting the jacking/boring forces involved. Welding is to be performed by a certified welder.

401.12 - Pipe Bursting

401.12.1 - Piping and Bends

High density polyethylene pipe in accordance with City of Idaho Falls Standard Specifications shall be used in pipe bursting installation. All piping system components shall be the production of a single manufacturer and shall conform to the latest edition of ASTM D1248, ASTM D3350, and ASTM F714.

Piping and bends shall be extruded from a polyethylene compound and shall conform to the following requirements:

1. The polyethylene resin shall meet or exceed the requirements of ASTM D3350 for PE 3408 material with a cell classification of 335434C, or better.
2. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black, well dispersed by precompounding in a concentration of not less than two (2) percent.
3. The maximum allowable hoop stress shall be eight- hundred (800) psi at seventy-three point four (73.4) degrees Fahrenheit.
4. The pipe manufacturer shall be listed with the Plastic Pipe Institute as meeting the recipe and mixing requirements of the resin manufacturer for the resin used to manufacture the pipe.
5. The pipe and bends shall have a minimum standard dimension ratio (SDR) wall thickness as required by the installation method, bedding and loading conditions encountered at the project site.
6. Joining shall be performed by thermal butt fusion in accordance with the manufacturer's recommendations.
7. Sanitary sewer pipe exterior shall be green in color or contain green striping. Sanitary sewer pipe interior shall be light in color for internal video inspection.

All polyethylene pipe shall be cut, fabricated and installed in strict conformance with the pipe manufacturer's recommendations. Joining, laying and pulling of polyethylene pipe shall be accomplished by personnel experienced in working with polyethylene pipe. **The pipe supplier shall certify in writing that the Contractor is qualified to join, lay, and pull the pipe or representative of the pipe manufacturer shall be on site to oversee the pipe joining.**

Care shall be taken during transportation of the pipe to ensure that it is not cut, kinked or otherwise damaged.

Pipe shall be stored on level ground, free of sharp objects, which could damage the pipe. Stacking of the polyethylene pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipe under anticipated temperature condition. Where necessary due to ground conditions, the pipe shall be stored on wooden sleeper, spaced suitably and of such widths as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

The handling of the joined pipeline shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Ropes, fabric or rubber protected slings and straps shall be used when handling pipes. Chains, cables or hooks inserted into the pipe ends shall not be allowed. Two slings spread apart shall be used for lifting each length of pipe. Pipe or fittings shall not be dropped onto rocky or unprepared ground. Slings for handling the pipe shall not be positioned at butt-fused joints. Sections of the pipes with cuts and gouges exceeding 10 percent of the pipe wall thickness or kinked sections shall be removed and the ends rejoined.

The open ends of all sections of joined and/or installed pipe (not in service) shall be plugged at night to prevent animals or foreign material from entering the pipeline or pipe section. Waterproof nightcaps of approved design may be used but they shall be so constructed that they will prevent the entrance of any type of natural precipitation into the pipe and will be fastened to the pipe in such a manner that the wind cannot blow them loose. The practice of stuffing cloth or paper in the open ends of the pipe will not be considered acceptable.

Where possible, the pipe shall be raised and supported at a suitable distance back for the open end such that the open end will be below the level of the pipe at the point of support.

401.13 - Pipe Lining

401.13.1 - Liner

Unless specifically noted in the Plans materials used in pipe lining shall consist of either folded/formed PVC as designated in ASTM F 1947 or those linings conforming to ASTM F 1216, ASTM F 1743 or ASTM F 2019.

All liner shall be cut, fabricated and installed in strict conformance with the manufacturer's recommendations. Installation of the liner shall be accomplished by personnel experienced in working with the proposed material. **The supplier shall certify in writing that the Contractor is qualified to place the liner or a representative of the pipe manufacturer shall be on site to oversee the work.**

It shall be the Contractor's responsibility to verify the diameter and lengths of liner required for each installation. Existing pipe diameters will be denoted in the Plans, however due to possible degradation of the pipe to be lined the Contractor shall field verify the in-place diameter of the pipe.

Care shall be taken during transportation of the liner to ensure that it is not damaged prior to installation.

401.14 - Handrail

401.14.1 - Aluminum Handrail

Aluminum pedestrian rail shall be natural aluminum color. Completed aluminum railing unit shall be anodized after fabrication conforming to the requirements of the Aluminum Association Standards for anodized architectural aluminum, class I anodic coating, AA-C22-A41.

The base metal for aluminum railing shall be ASA alloy designation 6063-T6. Pipe and tubing shall be extruded conforming to the requirements of ASTM B 429, Plates and sheets shall be rolled conforming to ASTM B 209, and rods, bars or shapes shall be extruded conforming to ASTM B 221.

Horizontal rails and vertical support posts shall be one and one-half (1-1/2) inch diameter standard pipe and balusters shall be three-quarter ($\frac{3}{4}$) inch diameter standard aluminum pipe. Rails, posts and balusters shall be machine cut to provide a uniform length prior to assembly.

401.14.2 - Galvanized Steel Handrail

Steel railing materials shall be welded or seamless steel pipe conforming to the requirements of ASTM A 120, structural steel conforming to ASTM A 365, or tubular sections of hot rolled mild steel, conforming to ASTM A 501. All welding shall conform to American Welding Society Structural Welding Code AWS D1.1. After fabrication each section of railing shall be hot-dipped galvanized with a minimum zinc coating of two (2) ounces per square foot. All burrs and sharp edges shall be removed prior to galvanizing.

Field welds shall be galvanized with such materials as "Galvalloy" or Galvicon. Painting of welds will not be permitted.

Horizontal rails and vertical support posts shall be one and one-half (1-1/2) inch diameter standard pipe and balusters shall be three-quarter (3/4) inch diameter standard aluminum pipe. Rails, posts and balusters shall be machine cut to provide a uniform length prior to assembly.

401.15 - Parking Wheel Blocks

Parking Wheel Blocks shall be yellow in color for regular parking stalls and blue for handicap accessible parking stalls. Parking Wheel Blocks shall consist of solid plastic stops that have at least two anchoring holes predrilled or formed within the block.

Parking Wheel Blocks shall be a minimum of four (4) inches tall, six (6) inches wide and six (6) feet in length.

Anchoring shall consist of at least two rebar stakes that are sized and driven to the depth suggested by the Parking Wheel Block Manufacturer.

402 - EQUIPMENT

402.01 - Paint Machine

The paint machine shall be capable of satisfactorily applying the paint under pressure with uniformity of feed through nozzles spraying directly upon the pavement. This equipment shall provide a uniform film thickness and markings of uniform cross-sections with clear-cut edges. The equipment shall be capable of producing a relatively straight or uniformly curving line to match the alignment as required. The stripes shall be uniform and free of erratic waves. The paint machine shall be capable of applying two separate stripes, either solid or skip, at the same time. The Paint Machine shall be capable of applying a fifteen (15) mil wet paint thickness at operating speeds between twelve (12) and fifteen (15) miles per hour. Each nozzle shall be equipped with satisfactory cutoff valves, which will apply broken or skip lines automatically. Each nozzle shall have a mechanical bead dispenser that will operate simultaneously with the spray nozzle and distribute the glass beads uniformly regardless of variation in speed of travel. Each nozzle shall also be equipped with suitable line guides consisting of metallic shrouds or air blasts.

402.02 - Cold Milling Machine

The cold milling machine used to construct cold milling edge treatment and end treatment as defined within this section shall be specially designed and built for milling of bituminous pavements without the addition of heat, with the ability to plane Portland cement concrete patches, where required, in the bituminous pavement. The cutting drum shall be a minimum of one-hundred twenty (120) inches wide and shall be equipped with carbide-tipped cutting teeth placed in a variable lacing pattern to produce the desired finish.

The machine shall be capable of being operated at speeds from zero to forty (0-40) feet per minute. It shall be self-propelled and have the capability of spraying water at the cutting drum to minimize dust. The machine shall be capable of removing the material next to the gutter of the pavement being reconditioned and be designed so that the operator can at all times observe the milling operation without leaving the controls. The machine shall be adjustable for slope and depth and shall be capable of milling a maximum of three (3) inches in depth, in one pass without producing fumes or smoke. The milling machine shall discharge milled material to the front of the machine.

The maximum longitudinal and transverse variance allowed for the finished milling shall be one-quarter ($\frac{1}{4}$) inch in depth per ten (10) feet measured longitudinally.

404 - TESTING

404.01 - Pipe Bursting

The Contractor shall be required to perform low-pressure air testing as described in Subsection 704, prior to reestablishing service connections.

404.02 - Pipe Lining

The Contractor shall be required to perform low-pressure air testing as described in Subsection 704, prior to reestablishing service connections.

405 - CONSTRUCTION

405.01 - Adjust Manhole Ring

The Contractor shall adjust existing manhole rings to the new finished grade in accordance with these Specifications. The adjustment shall be made as shown in the "Manhole Ring Adjustment Detail" of the Standard Drawings and in close conformity with the lines and grades shown on the Plans and as directed by the City Engineer. Final adjustments shall be by means of adjusting bolts and non-shrink grout as shown in the Standard Drawings. A maximum of twelve (12) inches total height of grade rings shall be used unless otherwise directed by the City Engineer. Class 4 concrete shall be used for the manhole ring adjustment and collar, unless otherwise directed by the City Engineer.

405.01.1 - Inspection

Prior to the start of construction, the Contractor shall tour the project site with a representative of the City's Sewer Department and determine if there are any damaged or non-standard rings or covers. Any items so noted shall be replaced by the Contractor with a new standard ring and cover supplied by the City's Sewer Department. All non-standard covers shall be returned to the City's Sewer Department.

405.01.2 - Construction

The Contractor shall remove any concrete and asphalt pavement to the required diameter as shown on the Standard Drawings. The existing ring and cover shall be removed. If necessary, the existing cone section shall be removed and any required barrel sections removed or installed to bring the ring to within one (1) foot of the finished grade. The existing cone shall be installed and any necessary grade rings shall be placed on top of the cone. The existing ring and cover, or new one if the existing one was noted as non-standard or damaged during the inspection, shall be installed. Aggregate base material shall be placed and compacted around the manhole to within three (3) inches of the top of the cone. A concrete collar shall then be poured around the top of the cone, any grade rings required, and the ring as shown on the Standard Drawings.

405.02 - Adjust Water Valve Box

The Contractor shall adjust an existing water valve box to the new finished grade of a street and/or alley in accordance with these Specifications, the "Water Main Valve Installation Detail" of the Standard Drawings and in close conformity with the lines and grades shown on the Plans and as directed by the City Engineer. Class 4 concrete shall be used for this adjustment, unless otherwise directed by the City Engineer.

405.02.1 - Inspection

Prior to the start of construction, the Contractor shall tour the project site with a representative of the City's Water Department and determine if there are any damaged or non-standard valve box tops or covers. Any items so noted shall be replaced by the Contractor with a new standard valve box top and lid supplied by the City's Water Department. Any non-standard lids shall be returned to the City's Water Department.

405.02.2 - Construction

The Contractor shall remove any concrete and asphalt pavement to the required diameter as shown on the Standard Drawings. The existing box and lid shall be removed. If necessary, the existing bottom shall be cut or a riser section shall be installed to bring the box to the finished grade. All joints between sections shall overlap a minimum of two (2) inches. The existing box and lid, or new one if the existing one was noted as non-standard or damaged during the inspection, shall be installed. Aggregate base material shall be placed and compacted around the box to the proper grade. A concrete collar shall then be poured around the top of the box as shown on the Standard Drawings. If the valve nut is found to be at a depth greater than six (6) feet after the adjustment, the Contractor shall provide and install a valve extension as shown in the Standard Drawings. Care should be exercised during the construction that debris does not fall into the box.

405.03 - Adjust Curb Stop Box

The Contractor shall adjust an existing curb stop box to the new finished grade of a street and/or alley section in accordance with these Specifications, Standard Drawings and in close conformity with the lines and grades shown on the Plans and as directed by the City Engineer.

405.03.1 - Inspection

Prior to the start of construction, the Contractor shall tour the project site with a representative of the City's Water Department and determine if there are any damaged curb stop boxes. The Contractor shall replace any items so noted with a new curb stop box supplied by the City's Water Department.

405.03.2 - Construction

The Contractor shall adjust the existing curb stop box to the new finished grade, including furnishing and placing any curb stop box extensions and adjust the shut-off rod to the required depth with an extension if necessary. A curb stop box which falls within an area where concrete must be placed shall be covered with "form oil" or other similar bond breaking agent which will prevent the concrete from adhering to the box or curb box sleeve. Concrete placed around

the curb stop box shall be finished in such a manner that the cap does not present a hazard to pedestrian traffic, but the cap can still be removed when necessary for operation of the curb stop valve. The Contractor shall install a four (4) foot metal fence post, painted fluorescent orange, adjacent to the top of the curb stop box in undeveloped areas.

405.04 - Relocate Mailbox Stand

The Contractor shall relocate an existing mailbox stand to a new location in accordance with these Specifications and in close conformity with the lines and grades as shown on the Plans and as directed by the City Engineer.

405.04.1 - Construction

Prior to any work, the Contractor shall contact the Post Office Route Master and coordinate the removal, reinstallation and any temporary location of the mailbox stand so as to ensure uninterrupted mail delivery. The Contractor shall remove the existing mailbox stand, install it or a temporary box in the temporary location if necessary and install the existing mailbox stand in the new location. All work shall be done in a manner which ensures the existing mailbox and stand are not damaged and that the new installation is of equal or better quality when completed.

405.05 - Fence

405.05.1 - Chain Link Fence Construction

The Contractor shall install chain link fence in accordance with these Specifications, Standard Drawings and in reasonably close conformity with the lines and grades shown on the Plans or as directed by the City Engineer. All concrete used for this work shall be Class "4". Posts spacing and footing size shall be determined by the height and type of fence as shown on the details in the Standard Drawings. The post shall be embedded a minimum of thirty-six (36) inches in the concrete footings and have a minimum of three (3) inches of concrete cover on the bottom. The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish, slightly higher than the ground, sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within two (2) days after the individual post footing is completed. The top rail shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion. Horizontal braces, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts, bends, and line bracing (at a maximum of three hundred (300) feet between braces), all as shown on the details on the Standard Drawings. The wire fabric shall be firmly attached to the posts and braced in the manner shown on the details on the Standard Drawings. Grading shall be performed where necessary to provide a

neat appearance. The woven wire shall be placed on the side of the posts away from the property, or as directed, and at the height indicated on the details on the Standard Drawings. The woven wire shall be carefully stretched and hung without sag and with true alignment. Care shall be taken not to stretch the wire so tightly that it will break in cold weather or pull up corner and brace posts. All horizontal wires shall be fastened securely to each post by fasteners or clips designed for use with the posts furnished. The wire shall be secured to prevent slipping up and down the post. Gates (vehicular and pedestrian) shall be constructed as shown on the details on the Standard Drawings. All material and construction methods shall meet the same requirements as the fence.

405.05.2 - Wood Fence Construction

The Contractor shall install wood fence in accordance with these Specifications and in reasonably close conformity with the lines and grades shown on the Plans or as directed by the City Engineer. All concrete used for this work shall be a minimum of Class two (2). Posts spacing and footing size shall be determined by the height and type of fence, but as a minimum shall conform to standard construction practices. The post shall be embedded a minimum of twenty-four (24) inches, be encased in concrete and have a minimum of three (3) inches of concrete cover on the bottom. The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish, slightly higher than the ground, sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within two (2) days after the individual post footing is completed. A minimum of two rails shall be installed between posts.

Grading shall be performed where necessary to provide a neat appearance. The wood slats shall be placed on the side of the posts away from the property, or as directed, and at the height indicated on the Plans. Gates shall be constructed at the locations and to the dimensions shown in the Plans. All material and construction methods shall meet the same requirements as the fence.

405.05.3 - Remove and Reset Fence

This item shall consist of the Contractor removing the existing fence and reinstalling the fence in the designated location once all work has been completed that would allow the fence to be reset. The Contractor shall use all necessary care during fence removal to insure that it can be reset at the location shown. After the required contract work has been completed in the vicinity of the fence location, the fences shall be replaced and restored to their original condition using either existing materials or other new or used materials of equal type and condition. The restored fence shall be equal in all respects and conditions to the original fence. The City shall delineate the location of the restored fence.

During the interval between removal and resetting the fence, the Contractor may be required, if indicated, to provide sufficient temporary fencing.

405.06 - Traffic Control Devices

This work shall be performed by a Contractor who specializes in the installation of traffic control devices in public right-of-ways and shall be familiar with City, State and Federal requirements. All traffic control devices shall be constructed in accordance with these Specifications, the Standard Drawings and the current Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways at locations shown on the Plans and as directed by the City Engineer.

405.06.1 - Coordination

All construction activities shall be coordinated with the City Engineer prior to the start of any work. It shall be the responsibility of the Contractor to insure that posts are not placed where they could incur damage to sprinkler system, illumination system, landscape work, etc... It shall also be the responsibility of the Contractor to coordinate his work so that sleeves for sign posts are placed in the area where sidewalks, driveways and concrete pads are to be constructed, just prior to the placement of the concrete. Any damage that is done to other utilities within the project site that is caused from the installation of traffic control devices shall be the sole responsibility of the Contractor and the Contractor shall bear any associated costs for repairs.

405.06.2 - Post Installation

Sign posts shall be installed vertically and shall not lean, twist, or otherwise be out of alignment. Signs shall be mounted approximately at right angles to the direction of, and facing, the traffic that they are intended to serve. At curved alignments, the angle of placement should be determined by the course of approaching traffic rather than by the roadway edge at the point where the sign is located. Signs shall be mounted so as to be a minimum of seven (7) feet from the bottom of the sign to the nearest edge of the pavement or sidewalk. In the case of a supplemental sign, the allowable height shall be one (1) foot less than the appropriate height specified above. Ground installed post mounted signs shall be installed a minimum of two (2) feet from the travel lane or face of curb as shown in the detail on the Standard Drawings.

405.07 - Pavement Markings

Where crosswalks, stop bars, arrows, lettering, and lines wider than one (1) foot are required, they shall all be Thermoplastic meeting the requirements of Subsection 401.02.6. Thermoplastic materials shall not be installed prior to seal coating new pavements; therefore temporary striping shall be installed if new

pavement is not seal coated the same year the underlying pavement is placed. There shall be no additional payment for temporary striping.

All pavement marking activities shall be coordinated with the City Engineer prior to the start of this work. Painted pavement markings shall be applied only when surfaces of the pavement are clean and thoroughly dry and the air temperature is above forty (40) degrees Fahrenheit. The Contractor shall be responsible for establishing the centerline and lane lines of all roadways to be striped by spotting with temporary reflective striping tape, paint or temporary pavement markers prior to painting.

The Contractor shall place and maintain suitable warning signs, flags, barricades, flagmen, protective screens, or coverings as required. All painted surfaces shall be protected from traffic until the paint is thoroughly dry.

405.07.1 - Application

The painted pavement markings shall be applied by the use of a spray-type marking machine or other marking equipment that shall meet the approval of the City Engineer. Application of paint by hand methods will be permitted only where necessary for proper forming. The paint shall be thoroughly mixed prior to application. No thinning of the paint shall be permitted. Should delays occur during application, in which the paint is non-agitated for a period greater than fifteen (15) minutes, the paint shall be thoroughly agitated until the mixture is homogeneous prior to continuance of applications. The paint shall be applied at a rate of not less than one (1) gallon per one hundred (100) linear feet of surface for four (4) inch width solid traffic lines. The minimum rate of application for broken traffic lines shall be prorated.

Glass beads shall be applied simultaneously with the application of the paint in such a manner as to provide good adhesion and refraction. Glass beads shall be applied at a minimum rate of six (6) pounds of beads for each gallon of paint used.

Stripes shall be four (4) inches wide, and be within a tolerance of five (5) percent, unless shown otherwise on the Plans. Broken line segments (dashed or skip traffic stripe) shall be eight (8) feet in length with seventeen (17) foot gaps or current City standards for length and gap of paint line. Arrows and letters shall be of the dimensions as shown in the details on the Standard Drawings. These special pavement markings shall be placed using such guidelines, templates and forms as required.

Painted pavement markings shall not deviate from the intended alignment by more than two (2) inches in any one hundred (100) foot length. It is intended that the paint stripes on curvilinear alignments have the same consistency of alignment, except the allowable deviation shall be as compared to a uniformly curving line. If the markings are not satisfactorily applied, work shall be stopped

until corrective action is taken. All markings shall present a clean cut, uniform and workmanlike appearance. The Contractor at his expense shall correct all markings, which fail to have a uniform, satisfactory appearance, either day or night. Any pavement markings that need to be corrected or removed shall be sandblasted or hydro blasted completely from the roadway surface to the satisfaction of the City Engineer prior to the application of the new pavement markings.

405.08 - Illumination System

The Contractor shall furnish and install the entire illumination system at locations as shown on the Plans and as directed by the City Engineer. All work shall be done in accordance with the Plans, Special Provisions and Idaho Falls Power requirements.

405.09 - Traffic Signal System

The Contractor shall furnish and install the entire traffic signal system in an intersection at locations as shown on the Plans and as directed by the City Engineer. All work shall be done in accordance with the Standard Drawings, Plans, Special Provisions and Idaho Falls Power.

405.09.1 - Traffic Signal Loops

Where designated for specific installation the Contractor shall provide all equipment, labor, tools, equipment and materials necessary to install traffic signal detector loops as recommended by the manufacturer and as shown on Sheet 400-9 of the City of Idaho Falls Standard Drawings. All lead-in and loop cable shall be Canoga No. 3003. No substitution will be allowed.

Loops shall be cut in the existing pavement and sealed, after cold milling has been completed. Under no circumstances will installation of loops be cut into the newly placed overlay.

405.10 - Sprinkler System

A firm specializing in sprinkler work shall do all work that is contemplated under this item. All materials used in the sprinkler system shall be available in Idaho Falls for future maintenance requirements. All sources of material supply shall be verified prior to bidding. Failure to do so will not relieve the Contractor from his responsibility for furnishing and installing all the materials in strict accordance with these requirements at the locations as shown on the Plans or as directed by the City Engineer and without additional expense to the City of Idaho Falls.

405.10.1 - Permit Requirements

The Uniform Building Code requires a Sprinkler Permit and an Electrical Permit for the installation of sprinkler systems. Low voltage wiring for the sprinkler control does not require an electrical license or permit. Work and materials shall be in accordance with these specifications, current rules, regulations, and other applicable State or local laws. Nothing in the Contract Documents is to be construed to permit work not conforming to these codes. The Contractor shall be required to provide and install a City Building Department approved backflow device in accordance with the requirements of the City Building Official.

405.10.2 - System Coverage

The Contractor shall review the system design to ensure that adequate coverage is obtained. Adjustments in the system shall be made as necessary to provide coverage, avoid existing fixed obstructions or minimize elevation changes in any lateral line at the Contractor's discretion.

405.10.3 - Service Connection

The installation of the system water supply shall be done in accordance with the City of Idaho Falls City Engineering Department Standard Specifications for Water Systems and the Water Supply Detail shown on the Plans. Any changes that are made to this detail shall require prior approval of the City Engineer.

405.10.4 - As Builts

The Contractor shall prepare accurate "As-Built" drawings as installation proceeds and shall submit these drawings on twenty four (24) inch by thirty (36) inch or eleven (11) inch by seventeen (17) inch reproducible mylar sheets prior to final inspection. Upon acceptance of the system, the drawings shall be sectionalized so that the circuits for each controller are shown on separate sheets. These sheets shall be reduced to two (2) complete sets with color keyed circuits and laminated in plastic. One (1) set of these drawings shall be distributed throughout the system controller boxes. The other set shall be bound in a ring-type binder. The final payment for this sprinkler system shall not be authorized until all drawings are complete, submitted and accepted by the City Engineer.

405.10.5 - Equipment Storage and Protection

During construction and storage, sprinkler system materials shall be protected from damage and prolonged exposure to sunlight. Any damages due to sprinkler system installation shall be replaced or repaired, at no additional expense, to the satisfaction of the City Engineer.

405.10.6 - Installation

Installation of the controller, conduit, wiring and electric valves shall be in accordance with the typical details shown on the Plans, the Manufacturer's recommendations and the City Building Department requirements.

Electric valves shall be installed at the highest locations to prevent damage and allow access during periods of flooding. The electric valves shall be installed in a plastic valve box with a reinforced heavy-duty lock top or snap top plastic lids. The top of the valve shall be installed a minimum of six (6) inches below the top of the valve box. Single valves shall be installed in a round valve box with a minimum diameter of ten (10) inches. Multiple valves may be installed in a single properly sized valve box, provided the valves are installed with sufficient clearance to allow removal without damage or removal of the box, other valves or lines. The valve boxes shall be set to finish grade in the landscape areas. Valve boxes must be notched to give a two (2) inch minimum clearance from the main or lateral lines.

IRRIGATION SYSTEM DEFINITIONS	
SERVICE LINE	The line from the City water main to the backflow device.
MAIN LINE	The line or lines from the backflow device to the electric valves.
LATERAL LINE	The lines from each electric valve to the last sprinkler head.

Main lines shall be installed at an approximate depth of twelve (12) to fourteen (14) inches below finish grade. Lateral lines shall be installed to an approximate depth of eight (8) to twelve (12) inches below finish grade. Lateral lines shall not cross asphalt or concrete areas if possible. Cutting of continuous lateral lines for the installation of sprinklers shall not be allowed.

The service line shall be installed in accordance with the Water Supply Detail. Service line pipes shall be two (2) inch Type K Copper from the City supply point to the point depicted in the Standard Drawings. A two (2) inch tee, with an approved quick connect coupler at finish grade shall be installed between the curb stop and the backflow device. The backflow device shall be installed in accordance with the City Building Department requirements. Two (2) inch galvanized pipe shall be installed from the backflow device between twelve to fourteen (12 - 14) inches below ground. The change from galvanized to plastic, as shown in the Standard Drawings, and any size reduction shall occur at the same location. The proper adapters for connecting dissimilar types of pipe shall be used.

405.10.7 - Adjustments

Adjust sprinkler heads in the lawn areas to proper grade when sod is sufficiently established to allow walking on it without appreciable damage. Also adjust sprinkler heads for proper distribution and trim. Such adjustments to the sprinkler heads shall be without any additional cost.

405.10.8 - Inspection and Acceptance

When the entire sprinkler system is completed and the proper inspections and approvals by the City Building Department have been completed, the Contractor shall submit copies of the approvals and request acceptance by the City Engineer. Where sprinkler system work does not comply with the requirements, the Contractor shall repair and/or replace the work, and then resubmit his request for approvals by the Building Department and acceptance by the City Engineer. The Contractor shall remove all rejected materials promptly from the project site.

405.11 - Street Monument

This section covers the work of the Contractor furnishing and installing a street monument, either for street P.I.'s or control monuments, at locations as shown on the Plans and as directed by the City Engineer.

The City Engineer or Surveyor shall mark the location, using off-sets, for the installation of the street monument for street P.I.'s and/or control monuments. The street monument for street P.I.'s shall be installed one-eighth (1/8) inch minimum below finished street surface. The street monument for control monuments shall be installed approximately three (3) inches to five (5) inches below the finished street surface. Both of these types of street monument shall be installed in such a manner that the center shall be within one-half (1/2) inch of the marked point and in accordance with the Standard Drawing detailing these two (2) types of street monument.

The street monument itself shall consist of a three-quarter (3/4) inch by thirty (30) inch minimum size iron rod with a molded aluminum alloy cap as manufactured by Berntsen (number D5200) or approved equal. When the street monument is installed for a control monument, it shall also require the installation of a molded aluminum alloy box lid section (with required lettering stamped or molded in cap as shown on Standard Drawing detail) as manufactured by Berntsen (number BMAC-5 or BMAC-6) or approved equal. A five (5) inch or six (6) inch PVC sleeve will be required for the installation of this box lid section.

The actual marking of these two (2) types of street monument shall only be performed by a professional land surveyor.

405.12 - Modular Block Retaining Wall

This work shall consist of furnishing and construction of Modular Block Retaining Wall System in accordance with these specifications and in reasonably close conformity with these specifications and with the lines, grades, design and dimensions shown on the Plans.

405.12.1 - Certification

Contractor shall submit a Manufacturer's certification, prior to start of work, that the retaining wall system components meet the requirements of these City of Idaho Falls standard specifications.

405.12.2 - Wall Excavation

The Contractor shall excavate to the lines and grades shown in the Plans or Standard Drawings. The City Engineer will inspect the excavation and approve prior to placement of leveling materials or fill soils.

405.12.3 - Wall Base Leveling Pad

A leveling pad shall be installed as shown in the Standard Drawings and as directed by the City Engineer. The leveling pad shall be constructed using Class 4 concrete.

405.12.4 - Modular Block Retaining Wall Unit Installation

The first course of units shall be placed on the leveling pad, and alignment and level checked. Pins or molded surfaces of modular concrete units shall be used for alignment control. The Contractor shall position vertically adjacent modular concrete units as recommended by the Manufacturer. The maximum stacked vertical height of wall units, prior to wall drain fill and backfill placement and compaction, shall not exceed two courses. Cap units shall be glued to underlying units with an adhesive recommended by the manufacturer.

405.12.5 - Geogrid Installation

Geogrid shall be oriented with the highest strength axis perpendicular to the wall alignment. Geogrid reinforcement shall be placed at the elevations and to the extent shown in the Standard Drawings, Construction Drawings, and as directed by the City Engineer. The geogrid shall be laid horizontally on compacted backfill. Place the next course of modular concrete units over the geogrid. The geogrid shall be pulled taut, and anchored prior to backfill placement on the geogrid. Geogrid reinforcements shall be continuous throughout their embedment lengths. Spliced connections between shorter pieces of geogrid are not allowed unless pre-approved by the City Engineer prior to construction.

405.12.6 -Wall Reinforced and Backfill Placement

Reinforced backfill shall be placed, spread and compacted in such a manner that minimizes the development of slack in the geogrid. Reinforced backfill shall be placed and compacted in lifts not to exceed eight (8) inches where hand compaction is used, or twelve (12) inches where heavy compaction equipment is used. Reinforced backfill shall be compacted to ninety-five (95) percent of the maximum density as determined by ASTM D695. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be within two (2) percentage points dry of optimum. Only lightweight hand-operated equipment shall be allowed within 3 feet from the tail of the modular concrete unit. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum fill thickness of six (6) inches is required prior to operation of tracked vehicles over the geogrid. Tracked vehicle turning shall be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid. Rubber tired equipment may pass over geogrid reinforcement at slow speeds, less than ten (10) miles per hour. Sudden braking and sharp turning shall not be allowed. At the end of each day's operation, the Contractor shall slope the last lift of reinforced backfill away from the wall units to direct runoff away from wall face. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

405.13 - Landscaping

This work shall consist of furnishing all landscaping in accordance with these specifications and in reasonably close conformity with the Plans. A firm specializing in landscape work shall do all work that is contemplated under this item.

405.13.1 - Preparation for Planting Trees

The Contractor shall provide good quality topsoil to fill planters prior to the installation of the landscaping. Topsoil material shall be approved prior to delivering to the job site. The topsoil shall be installed using a method to provide adequate compaction while providing a suitable planting medium. As the planters are being filled, care shall be exercised to insure the proper support and protection for the sprinkler system.

The Contractor shall layout individual tree locations in the various areas for planting. Stake locations and outline areas and secure City Engineer's acceptance before start of planting work. Make minor adjustments as may be required and/or requested.

Proceed with and complete the tree planting work as rapidly as portions of the site become available, working within the seasonal limitations for the kind of

tree planting work required. Determine location of underground utilities and perform work in a manner that will avoid possible damage.

Hand excavate, as required, to minimize possibility of damage to underground utilities. Excavate circular pits with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage and loosen hard topsoil in bottom of excavation. Fill excavations for trees with water and allow water to percolate out before planting.

For balled and burlapped (B & B) trees, make excavations at least twice as wide as the ball diameter and equal to the ball depth, and loosen approximately four (4) to six (6) inches of the compacted topsoil below the bottom of the excavation.

405.13.2 - Planting Trees

Set balled and burlapped (B & B) stock on layer of compacted topsoil soil mixture, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades. When set, place additional topsoil around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately two-thirds (2/3) full, water shall be applied before installing remainder of backfill. Remove burlap from around base of tree approximately two-thirds (2/3) down the ball and open to sides of the ball.

Set container grown stock as specified for balled and burlapped stock, except cut cans on two (2) sides with an approved can cutter and remove bottoms of wooden boxes after partial backfilling so as not to damage root balls.

Dish top of backfill to allow for mulching and provide additional backfill berm around edge of excavations to form shallow saucer to collect water. In tree planted areas, provide not less than a two (2) inch thickness of mulch to the top of the backfill topsoil, and finish level with adjacent sod. Prune, thin out and shape trees in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by the City Engineer, do not cut tree leaders and remove only injured or dead branches from flowering trees, if any. Remove and replace excessively pruned or malformed stock resulting from improper pruning.

Paint cuts over one-half (1/2) inch in size with standard tree paint or compound, covering exposed, living tissue. Use paint that is waterproof, antiseptic, adhesive, elastic, and free of kerosene, coal tar, creosote, and other substances harmful to plants. Do not use shellac.

Stake trees with two (2) wood stakes driven two (2) feet into the ground with the portion extending above the ground approximately one-half (1/2) of trunk

height. Stake one (1) foot from the trunk, fastened at approximately two-fifths (2/5) of trunk height with wire run through rubber hose.

405.13.3 - Preparation of Sod Bed

The topsoil area shall be carefully fine graded and rolled to provide a fine textured, smooth and firm surface, free of any footprints, undulations or irregularities. The finished grade of the sod bed shall be one to one and one-quarter (1 - 1 ¼) inches below the finished grade of the adjacent curbs and/or sidewalks to permit the placing of the sod to final grade. Additional topsoil may be required to establish this finished grade requirement.

405.13.4 - Placing Sod

Individual sod pieces shall be cut to a uniform size with square corners at a uniform depth of one to one and one-quarter (1 - 1-1/4) inches. The first row of sod shall be laid in a straight line and subsequent rows placed parallel to and tightly against each other. Lateral joints shall be staggered. Care shall be exercised to ensure that the sod is not stretched or overlapped, and that all joints are butted tightly. After placing sod, the lawn shall be adequately rolled diagonally and watered heavily.

405.13.5 - Cleanup and Protection

During landscape work, the Contractor shall store materials and equipment where directed and/or approved. Keep pavements and work area in an orderly condition. Protect landscape work and materials from damage due to other operations, by other Contractors, subcontractors and trespassers. Treat, repair or replace damaged landscaping as directed. Maintain protection during installation and maintenance period.

405.13.6 - Inspection and Acceptance

When the landscaping is completed, the City Engineer and a representative from the City Parks Department will, upon request, make an inspection to determine acceptability. Where inspected landscaping work does not comply with the requirements, replace rejected work, and continue specified maintenance until re-inspected by the City Engineer and found to be acceptable. Remove rejected materials promptly from the project site.

405.13.7 - Maintenance Period

The required maintenance period of the landscaping shall be until such time that the entire project has been given a substantial completion and the sprinkler system, in particular, is fully operational and has been accepted.

The Contractor shall be required to perform normal maintenance of the landscaping at such times and with such frequency as is in accordance with good

horticultural practices under the prevailing conditions. Maintenance shall include watering, weeding, resetting trees and sod to proper grades or upright position and removal of dead materials.

The establishment period for the lawn sod shall be until such time that the entire project has been given a substantial completion and the sprinkler system, in particular, is fully operational and has been accepted. Also, the remaining other landscape work, including the sodding, has to be completed prior to this establishment period ending.

405.13.8 - Establishment Period

Details of the establishment period for the sod lawn shall consist of: (1) protecting the sodded areas from trespass and other damages; (2) promoting the growth of the grass sod; (3) mowing; (4) removing clippings, weeds, litter and debris; and (5) reconditioning and/or replacing any sod which for any reason fails to show a healthy growth of the grass sod.

Sodded areas shall be watered at such times and with such frequency as is in accordance with good horticultural practices under the prevailing conditions.

If during the establishment period the grass requires mowing, the first mowing of grass shall be done when the grass has attained a height of approximately three (3) inches, and when the ground is sufficiently firm to prevent rutting. The height of grass after mowing shall normally be one and one-half (1-1/2) inches, subject to approved modification relative to the kind of grass and the season. Each subsequent mowing shall be done when the grass attains a height between two and one-half and three (2-1/2 and 3) inches and shall involve a reduction in the height of the grass of not less than one (1) inch.

Clippings shall be caught in grass catchers or shall be picked up from the mowed areas within two hours after mowing for the first two mowings and shall not be allowed to smother or retard grass growth. Weeding and removal of noxious vegetation shall be by individual or blanket treatment in accordance with accepted lawn care practices.

At the end of the establishment period, and as evidence thereof, each area of lawn construction shall reflect the faithful performance of all items of work mentioned above, and shall present the appearance of a healthy and well cared for lawn of uniform color, texture and condition, and be free of weeds.

405.13.9 Guarantee

The Contractor shall provide one-hundred (100) percent replacement guarantee of the landscaping materials for a period of one (1) year after date of Project substantial completion. The guarantee shall be for replacement due to defects including death and unsatisfactory growth, except for defects resulting

from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond Landscape Installer's control.

Remove and replace landscape materials that are found to be dead or in unhealthy condition during the guarantee period. Replace any missing trees or sod. Make replacements during growth season following the end of the guarantee period. Furnish and plant replacements, which comply with requirements shown and specified. Also, replace trees, which are in doubtful condition at the end of the guarantee period; unless, in the opinion of the City Engineer, it is advisable to extend the guarantee period for a full-growing season. The City Engineer will make another inspection at the end of the extended guarantee period, if any, to determine acceptance or rejection. Only a one time per each replacement will be required at the end of guarantee period, except for losses or replacements due to failure to comply with specified requirements.

405.14 - Drain Rock

This work shall consist of furnishing and placing drain rock in accordance with these specifications, in reasonably close conformity with the Plans and as directed by the City Engineer. Placement of drain rock shall be scheduled in such a way that other items of work will not cause contamination of the drain rock. The rock shall be protected from contamination by providing temporary berms or other protective structures until adequate vegetation is established and/or all geotextile surrounding the drain rock is in place. The Contractor at no additional cost shall remove and replace drain rock that becomes contaminated as a result of improperly protecting it from fine-grained soils eroding into it or other causes of contamination related to improperly protecting the rock from contamination.

405.15 - Riprap

This work shall consist of furnishing and placing riprap in accordance with these specifications, in reasonably close conformity with the Plans and as directed by the City Engineer. A toe trench for riprap shall be excavated below probable scour elevation or to the elevation shown on the Plans. Where scour elevation cannot be determined and no elevation is shown in the Plans, the trench shall be excavated two (2) feet below the final channel or finished grade. No stone shall be placed until the toe trench is approved by the City Engineer. The stones shall be placed so the larger stones are in contact with each other and the voids are filled with finer materials, producing a well-graded compact mass. The stone shall be placed in a manner to insure the specified thickness in one operation. When placing, care shall be taken to avoid disturbing underlying material or damaging a geotextile if a geotextile is specified.

405.16 - Conduit

This item shall consist of the Contractor providing all materials, tools, labor and equipment necessary for supplying and installing various diameter Conduit,

either PVC or Rigid Galvanized Steel. Conduit supplied shall meet all requirements for the intended use.

This item shall only be paid where designated. Conduit used for Traffic Signal Installation, Illumination System, Interconnect System, Sprinkler System and Lift Station shall be included in their respective bid items or be considered incidental to other items.

The conduit trench shall be as shown in the City of Idaho Falls Standard Drawing details on Sheet No. 400-9, "Conduit Installation Detail."

405.16.1 Conduit (PVC)

The Contractor shall provide Schedule 40 rigid P.V.C. electrical conduit in the sizes shown. The conduit and fittings shall meet the requirements of the National Electrical Manufacturers Association TC2 and TC9. All 90° bends and all conduit to be placed in concrete shall be rigid galvanized steel.

405.16.2 Conduit (Rigid Galvanized Steel)

The Contractor shall provide Rigid Galvanized Steel Electrical Conduit and galvanized steel fittings in the sizes shown. The conduit and fittings shall meet the requirements of the National Electrical Manufacturers Association TC2 and TC9. All 90° bends and all conduit to be placed in concrete shall be rigid galvanized steel.

405.17 - Silt Fence

Silt Fence used along the perimeter of disturbed ground areas shall be installed prior to the ground disturbing activity in accordance with these Specifications or as directed by the City Engineer. The silt fence will remain in place and be removed by the Contractor once all ground disturbing activities have been completed and grass seed has matured to full growth.

405.18 - Casing Installation

Casing installation shall involve placing the proposed casing at the elevations shown in the Plans or as directed by the City Engineer.

Installation by jacking/boring shall be in accordance with the following provisions:

1. Trenching in connection with jacking/boring shall be conducted no nearer than five (5) feet from the roadway subgrade edge if bulkheaded and not less than the vertical difference in elevation between the subgrade edge and the facility if not bulkheaded.

2. Jacking/boring shall be by approved means that will hold disturbances of surrounding material to a minimum. Sluicing or jetting will not be allowed. Sand or cement non-shrink grout packed in place shall be required where the hole is greater than five (5) percent oversize in diameter for pipelines larger than twelve (12) inch diameter.

The Contractor shall insure that the jack/bore operation is completed in compliance with applicable codes and regulations and in conformance with these specifications. The methods and equipment used in jacking/boring the casing shall be optional with the Contractor, provided that the City Engineer approves the proposed method. Such approval shall in no way relieve the Contractor of the responsibility for making a satisfactory installation meeting the criteria set forth herein.

The Contractor shall install steel casing in a manner that minimizes interference with adjacent utilities, vehicular, pedestrian and railway traffic and minimizes damage and interference with other adjacent property improvements.

The Contractor shall be permitted a tolerance from exact grade as specified in the applicable section dealing with the actual carrier pipe. The Contractor may oversize the casing to ensure that adequate space is available to insert the carrier pipe through the casing to the required grade.

Prior to jack/bore pit excavation and casing pipe installation, the Contractor shall submit a jacking/boring plan outlining the proposed construction procedures to the City Engineer for approval. The jacking/boring plan is to include:

1. Type of operation proposed.
2. Dimension of the operating pit.
3. Size and type of casing pipe to be installed.
4. Jack/bore time line including expected production rates (ft/day).

During steel casing installation, prevent caving ahead of the casing, which could cause voids outside of the casing. Washing, sluicing, or jetting will not be permitted.

If boring methods are used, do not advance the auger or rotary drill head more than one-third (1/3) foot ahead of the bit end of the casing.

When borings being excavated exceed normal soil unit volumes, withdraw the drill head inside of the casing bit end and use jacking or driving methods preceding the drilling operations.

Place approved spacers on the carrier pipe for its entire length exclusive of the pipe bells of sufficient height to permit clearance between the pipe bell and the casing wall. Secure the spacers to the carrier pipe using suggested manufacturer connections.

Fill the annular space between the casing and the carrier pipe at the end of the casing with approved watertight annular space backfill material or covers. Prevent floating or displacement of the carrier pipe and do not induce pressures that will collapse or distort the carrier pipe.

Jacking/boring pits shall be backfilled in accordance to City Standard Specifications.

405.19 - Pipe Bursting

The following construction procedures shall be performed as a minimum. Additional procedures shall be performed to accommodate actual conditions. The general procedure shall include the following:

1. Hydraulically clean existing piping.
2. Video inspect existing piping and locate existing laterals after initiating bypass pumping.
3. Perform point repairs, where applicable.
4. Perform pipe bursting process and conduct air testing.
5. Reconnect existing laterals.
6. Video inspect rehabilitated pipe.

405.19.1 - Installation

The Contractor shall submit a detailed description of the proposed techniques and procedures for rehabilitating the existing piping. The Contractor shall submit details to the City Engineer for approval prior to beginning work. The format shall generally conform to the following:

1. **Excavate Service Connections:** All active service connections shall be excavated to allow for reconnection once the replacement pipe is installed. Payment will be made per standard pay items for this work.
2. **Guidance System:** The pipe bursting guidance system shall be inserted into the existing host pipe through the entire section of pipe to be rehabilitated/replaced.

3. Insertion: Once the guidance system is installed, the new HDPE pipe and the pipe bursting replacement equipment shall be attached to the guidance system and then pulled back through the existing host pipe.
4. Finished Pipe: The finished replacement pipe shall be continuous over the entire length from manhole to manhole and be free from visual defects such as foreign inclusions, dry spots, keel, boat hull, pinholes, wrinkles and other deformities. The replacement pipe passing through or terminating in a manhole shall be carefully cut out in a shape and manner approved by the City Engineer. The invert and benches shall be streamlined and improved for smooth flow. The replacement pipe shall also meet the leakage requirements of pressure test as specified. Any defect, which will affect the integrity or strength of the pipe discovered during the warranty period, shall be repaired at the Contractor's expense.

405.19.2 - Sealing and Benches in Manholes

The replacement pipe shall be installed with a tight fitting seal with the existing manholes. The top half of the pipe within the manhole shall be neatly cut off and not broken or sheared off, at least four inches away from the manhole walls. The channel in the manhole shall be a smooth continuation of the pipe(s) and shall be merged with other lines or channels, if any. Channel cross-section shall be U-shaped with a minimum height of the half pipe diameter to three-fourths of the pipe diameter fifteen inches and larger. The side of the channels shall be built up with mortar/concrete as specified, to provide benches at a minimum of one in twelve (1 in 12) pitch towards the channel. The replacement pipe in the manhole shall be sealed as specified above before proceeding on to the next manhole section and all manholes shall be individually inspected for replacement pipe cut-offs, benches and sealing works.

405.19.3 - Service Reconnections

The exact location and number of service connections shall be determined from video inspections and/or in the field. It shall be the Contractor's responsibility to accurately field locate all existing service connections whether in service or not. The Contractor shall reconnect all service connections to the replacement pipe including those from unoccupied, abandoned or vacant lots, unless directed otherwise by the City Engineer. Each vacant lot shall also be provided with one service connection at an approved location. The Contractor shall be responsible for restoring/correcting, without any delay, all missed or faulty reconnections, as well as for any damage caused to property owners for not reconnecting the services soon enough or for not giving notice to the owners. All services, which are reconnected to replacement pipe, shall be shown on the "As Built Drawings" with the exact distances from adjacent manholes. All existing

service connections shall be reconnected through trench excavation unless approved otherwise by the City Engineer.

405.19.4 - Television Inspection

The Contractor shall provide to the City Engineer a color videotape taken by a three hundred-sixty (360) degree radial view camera for close up view showing the completed work, including the condition of the restored sewer connections.

405.20 - Pipe Lining

The following construction procedures shall be performed as a minimum. Additional procedures shall be performed to accommodate actual conditions. The general procedure shall include the following:

1. Hydraulically clean existing piping.
2. Video inspect existing piping and locate existing laterals.
3. Perform point repairs, where applicable.
4. Perform lining process.
5. Reconnect existing laterals.
6. Video inspect rehabilitated pipe.

405.20.1 - Installation

The Contractor shall submit a detailed description of the proposed techniques and procedures for lining the existing piping. The Contractor shall submit details to the City Engineer for approval prior to beginning work. The format shall generally conform to the following:

1. **Reinstate Service Connections:** All service connections shall be reestablished by robotic cutters. Payment for this work will be through established bid items. All other work associated with reinstating service connections shall be incidental to this bid item and no separate payment shall be made.
2. **Insertion:** Liner installation shall conform to the applicable specification and as per the manufacturer's recommendations.
3. **Finished Pipe:** The finished liner shall be continuous over the entire length from manhole to manhole and be free from visual defects. The liner passing through or terminating in a manhole shall be carefully cut out in a shape and manner approved by

the City Engineer. The invert and benches shall be streamlined and improved for smooth flow. Any defect, which will affect the integrity or strength of the pipe discovered during the warranty period, shall be repaired at the Contractor's expense.

405.20.2 - Sealing and Benches in Manholes

The liner shall be installed with a tight fitting seal with the existing manholes. The channel in the manhole shall be a smooth continuation of the liner. Channel cross-section shall be U-shaped with a minimum height of the half pipe diameter to three-fourths of the pipe diameter fifteen inches and larger. The side of the channels shall be built up with mortar/concrete as specified, to provide benches at a minimum of one in twelve (1 in 12) pitch towards the channel. The liner in the manhole shall be sealed as specified above before proceeding on to the next manhole section and all manholes shall be individually inspected prior to approval.

405.20.3 - Service Reconnections

The exact location and number of service connections shall be determined from video inspections and/or in the field. It shall be the Contractor's responsibility to accurately field locate all existing service connections whether in service or not. The Contractor shall reconnect all service connections to the liner including those from unoccupied, abandoned or vacant lots, unless directed otherwise by the City Engineer. Each vacant lot shall also be provided with one service connection at an approved location. The Contractor shall be responsible for restoring/correcting, without any delay, all missed or faulty reconnections, as well as for any damage caused to property owners for not reconnecting the services soon enough or for not giving notice to the owners. All services which are reconnected to the liner shall be shown on the "As Built Drawings" with the exact distance from the nearest downstream manhole. All existing service connections shall be reconnected with robotic cutters unless approved otherwise by the City Engineer.

405.20.4 - Television Inspection

The Contractor shall provide to the City Engineer a color videotape taken by a three hundred-sixty (360) degree radial view camera for close up view showing the completed work, including the condition of the restored sewer connections.

405.21 - Repair Sprinkler Systems

This item shall consist of removing and replacing all sprinkler systems that are damaged as a result of the construction. The Contractor shall remove the sprinkler systems where necessary to complete the required work. Upon completion of the required work, the sprinkler systems shall be restored to their

original location and condition using either existing materials or other new or used materials of equal type and condition as directed by the City Engineer. The restored sprinkler systems shall be equal or better in all respects and condition to the original sprinkler systems.

Prior to installation and/or removing existing sprinkler systems, the Contractor shall meet with the affected property owner to discuss the extent of the removal work. The Contractor shall also discuss the reinstallation of the sprinkler system, and jointly ascertain and agree upon the existing condition of any adjacent and surrounding objects, features, and facilities that may be affected by sprinkler system removal and installation. The Contractor shall be responsible for any and all damage that may occur to any adjacent or surrounding objects, features, or facilities. The Contractor shall (to the greatest extent possible) preserve, protect, restore and/or replace such facilities so that after completion of the project construction all such facilities are in a condition as good as, or better than, their original condition.

405.22 - Cold Milling

405.22.1 - Cold Milling

The Contractor shall cold mill existing asphalt concrete pavement, as dimensioned and as otherwise designed on the Plans or as directed by the City Engineer. Cold milling shall remove the designated variable depths of asphalt concrete to provide an overlay key at joints and over the width of the cold milled area. Additional widths of cold milling may be required at various locations as determined by the City Engineer. The surface of pavement after milling shall be uniformly rough grooved or ridged as directed by the City Engineer.

Structures and vertical joints in the cold milled area which are transverse to through traffic and greater than one and one-half (1-1/2) inches in height shall be ramped with temporary asphalt concrete pavement. Ramps shall be constructed the same day as cold milling and removed the same day as permanent paving. The Contractor shall erect appropriate signage delineating the hazard to the traveling public.

The maximum longitudinal and transverse variance allowed for the finished milling shall be one-quarter (1/4) inch in depth per ten (10) feet measured transversely or longitudinally. The Contractor, at no additional cost to the City, will correct any areas exceeding this maximum variance prior to paving.

A ramp shall be installed at the mill end, or the final overlay course started, a maximum of forty-eight (48) hours after the transition milling has been completed. The ramp shall have a minimum 50:1 (horizontal:vertical) slope.

405.22.2 - Edge Treatment

This work shall consist of the Contractor edge milling as shown in Standard Drawing Sheet Number 300-1, the Plans, as specified, and as directed by the City Engineer. The Edge Treatment shall be constructed using a milling machine as specified in Subsection 402. The Edge Treatment shall be milled to the depth shown in the Plans, Special Provisions or as directed by the City Engineer. The maximum longitudinal variance allowed for the finished milling shall be one-quarter (1/4) inch in depth per ten (10) feet measured longitudinally. The Contractor, at no additional cost to the City, will correct any areas exceeding this maximum variance prior to paving.

405.22.3 - End Treatment

This work shall consist of the Contractor constructing End Treatment (Mill or Excavate) as shown in the Plans, Standard Drawings Sheet Number 300-1, and as directed by the City Engineer.

405.23 - Handrail

Railing shall be erected and adjusted, if necessary, to assure a continuous line and grade. Finished railing shall be true and plumb. Unless otherwise denoted in the Plans or Special Provisions the type of Handrail (Aluminum or Galvanized Steel) used shall be at the Contractor's discretion.

405.23.1 - Aluminum Handrail

Aluminum pedestrian rail shall be fabricated and installed in accordance to these specifications and as per the Standard Drawing 400-18.

Welding shall conform to the requirement of the Aluminum Association. All exposed welds shall be ground flush with adjacent surfaces.

405.23.1 - Galvanized Steel Handrail

Galvanized steel pedestrian rail shall be fabricated and installed in accordance with these specifications and as per Standard Drawing 400-18.

All welding shall conform to American Welding Society Structural Welding Code AWS D1.1. After fabrication each section of railing shall be hot-dipped galvanized with a minimum zinc coating of two (2) ounces per square foot. All burrs and sharp edges shall be removed prior to galvanizing.

405.24 - Bollard

This work shall consist of the Contractor supplying all tools, labor and equipment necessary to install the type of Bollard designated for installation. Refer to the Standard Drawings, Sheet 400-20 for further details regarding

various types of bollard installations.

Materials: Concrete for bollard foundation shall be Class 4 meeting the requirements of the City of Idaho Falls Standard Specifications.

405.24.1 - Bollard (Permanent Installation)

Reinforcing steel shall meet the requirements of section 501.08 - Metal Reinforcing Materials of the City of Idaho Falls Standard Specifications.

Steel pipe shall be six (6) inch nominal size ANSI B36.10 Schedule 40 standard wall thickness. The inside of the pipe shall be filled with concrete and the outside shall be painted yellow with a minimum of two coats of approved paint and shall be wrapped in reflective tape as shown in the Standard Drawings.

Installation: The Bollard foundation shall be placed upon undisturbed subgrade. All concrete, reinforcing steel, and painting shall be in accordance with the City of Idaho Falls Standard Specifications, and as recommended by the Manufacturer.

405.24.2 - Bollard (Removable Installation)

Bollards shall consist of TRAFFICGUARD RP3503F or approved equal.

Installation: The Bollard foundation shall be installed as per manufacturer's recommendations. Concrete for the surrounding foundation shall be raised slightly above the finished pavement grade.

405.25 - Parking Wheel Blocks

This item shall consist of the Contractor providing all tools, labor, materials and equipment necessary to supply and install Parking Wheel Blocks at the locations depicted or as designated by the City Engineer.

405.26 - Storm Water Pollution Prevention Plan Implementation

This item shall consist of the Contractor providing all tools, labor, materials and equipment necessary to construct, install and maintain those items specifically associated with the signed Storm Water Pollution Prevention Plan (SWPPP) and serve as compensation for all administration associated with SWPPP implementation.

409 - MEASUREMENT AND PAYMENT

409.01 - Adjust Manhole Ring

409.01.1 - Measurement

All existing manhole rings that need to be adjusted to the new finished grade shall be measured on a PER EACH basis.

409.01.2 - Payment

The existing manhole rings that need to be adjusted to the new finished grade shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to adjust the existing manhole rings to the new finished grade complete and in place. The payment shall include the placing of the manhole ring, furnishing and placing of any required concrete grade rings, cone section, flat lid and/or barrel sections, and furnishing and placing of concrete around the ring to anchor and seal it to the cone section. Adjustment of manhole rings on new manholes installed under a project shall not be paid for under this item and the cost to adjust them to grade shall be included in the cost of the installed manhole.

409.02 - Adjust Water Valve Box

409.02.1 - Measurement

All existing water valve boxes that need to be adjusted to the new finished grade shall be measured on a PER EACH basis.

409.02.2 - Payment

The existing water valve boxes that need to be adjusted to the new finished grade shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to adjust the existing water valve boxes to the new finished grade complete and in place. The payment shall include the placing of required valve box top and lid, valve box extensions; adjust the valve stem to the required depth with an extension if necessary; and furnish and place concrete around the valve box. Adjustment of new water valve boxes installed under a project shall not be paid for under this item and the cost to adjust them to grade shall be included in the cost of the installed water valve.

409.03 - Adjust Curb Stop Box

409.03.1 - Measurement

All existing curb stop boxes that need to be adjusted to the new finished grade shall be measured on a PER EACH basis.

409.03.2 - Payment

The existing curb stop boxes, which need to be adjusted to the new finished grade, shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to adjust the existing curb stop boxes to the new finished grade complete and in place. The payment shall include the furnishing and placing of any curb stop box extensions and adjust the shut-off rod to the required depth with an extension if necessary. Adjustment of new curb stop boxes installed under a project shall not be paid for under this item and the cost to adjust them to grade shall be included in the cost of the installed curb stop.

409.04 - Relocate Mailbox Stand

409.04.1 - Measurement

All existing mailbox stands that need to be relocated to a new location shall be measured on a PER EACH basis.

409.04.2 - Payment

The existing mailbox stands that need to be relocated to a new location shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to relocate an existing mailbox stand to the new location complete and in place. The payment shall include the removal, any temporary installation and the concrete or miscellaneous fittings required to reinstall the existing mailbox stand in its final location.

409.05 - Fence

409.05.1 - Measurement

The various sizes and types of Fence and appurtenances shall be measured on a LINEAR FOOT basis along the top of the fence from center to center of end posts, excluding the length occupied by gate (vehicular and pedestrian) openings. The various sizes and types of pedestrian gates shall be measured on a PER EACH basis. The various sizes and types of vehicular gates shall be measured on a PER EACH basis.

409.05.2 - Payment for Chain Link Fence

The various sizes and types (with or without vinyl slats) of Chain Link Fence and appurtenances shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to install the Chain Link Fence complete and in place, excluding any gates. The payment shall include the furnishing of the fencing materials, such as fabric, posts, rails, braces, wire ties, tension wires, miscellaneous fittings and any other items required to install the Chain Link Fence complete and in place.

409.05.3 - Payment for Pedestrian Gates

The various sizes and types (with or without vinyl slats) of Pedestrian Gates shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to install the Pedestrian Gate complete and in place.

409.05.4 - Payment for Vehicular Gates

The various sizes and types (with or without vinyl slats) of Vehicular Gates shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to install the Vehicular Gate complete and in place.

409.05.5 - Payment for Wood Fence

The various sizes and types of Wood Fence and appurtenances shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to install the Wood Fence complete and in place, excluding any gates. The payment shall include the furnishing of fencing materials, such as wood slats, posts, rails, miscellaneous fittings, concrete for footings, connections and any other items required to install the Wood Fence complete and in place.

409.05.6 - Payment for Wood Gate

The various sizes and types of Wood Gates and appurtenances shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to install the Wood Gates complete and in place. The payment shall include the furnishing of gate materials, such as wood slats, posts, rails, miscellaneous fittings, connections and any other items required to install the Wood Gates complete and in place.

409.05.7 - Measurement for Remove and Reset Fence

The various sizes and types of Remove and Reset Fence shall be measured on a LINEAR FOOT basis along the top of the existing fence from center to center of end posts, including the length occupied by gate (vehicular and pedestrian) openings. The various sizes and types of gates shall be included in the total measurement for Remove and Reset Fence and shall not be measured independently.

409.05.8 - Payment for Remove and Reset Fence

The various sizes and types of Remove and Reset Fence shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to remove and reset the fence complete and in place, including any gates. The payment shall include the removal and replacement of fencing materials including foundations to ensure the restored fence shall be equal in all respects and conditions to the original fence.

409.06 - Traffic Control Sign Units

409.06.1 - Measurement

The various Traffic Control Sign Units shall be measured on a PER EACH basis. A traffic control sign unit shall consist of the following:

Type A	A sleeve in a concrete foundation, sign post and one (1) or two (2) regulatory, warning and/or information sign(s) and miscellaneous hardware.
Type B	A sleeve in a concrete foundation, sign post and one (1) or two (2) regulatory sign(s), two (2) double-faced street - name signs and miscellaneous hardware.
Type C	Banding one (1) or two (2) regulatory and/or warning sign(s) to metal street light poles and miscellaneous hardware.

409.06.2 - Payment

The various Traffic Control Sign Units shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to install the Traffic Control Sign Units complete and in place. The payment shall include the furnishing and installing of all materials and any other items required to install the Traffic Control Sign Units including excavation and backfill of sign post foundations, concrete for sign post foundations, sleeve for sign post, sign post, various sizes of signs and miscellaneous hardware. These items shall be incidental to and included in the cost of the Traffic Control Sign Units.

409.07 - Pavement Markings

409.07.1 - Measurement

Pavement Markings shall be measured on a LUMP SUM basis complete and in place. Thermoplastic Pavement Markings, as required, shall be included in this measurement.

409.07.2 - Payment

Pavement Markings shall be paid at the Contract unit price bid on a LUMP SUM basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to place these painted Pavement Markings at the locations as shown on the Plans and as directed by the City Engineer. The payment shall include the furnishing and application of all materials and any other items including the paint and glass beads required to place Pavement Markings at locations as shown on the Plans and as directed by the City Engineer. These items shall be incidental to and included in the lump sum cost of the Pavement Markings.

409.08 - Illumination System

409.08.1 - Measurement

The measurement for Illumination System shall be on a LUMP SUM basis complete and in place.

409.08.2 - Payment

Illumination System shall be paid at the Contract unit price bid on a LUMP SUM basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install the Illumination System including excavation and backfill of trenches for conduits, excavation and backfill for light pole foundations and junction boxes and reinforcing steel and concrete for light pole foundations. These items shall be incidental to and included in the lump sum cost of this Illumination System.

409.09 - Traffic Signal System

409.09.1 - Measurement for Traffic Signal System

The measurement for Traffic Signal System shall be on a LUMP SUM basis complete and in place.

409.09.2 - Payment for Traffic Signal System

Traffic Signal System shall be paid at the Contract unit price bid on a LUMP SUM basis. The payment shall be full compensation for all labor,

materials, equipment and tools necessary to furnish and install the Traffic Signal System including excavation and backfill of trenches for conduits; excavation and backfill for traffic signal pole foundations, control panel foundation and junction boxes; reinforcing steel and concrete for traffic signal pole foundations and control panel foundation and saw cutting of asphalt pavement (if required) for detector loops installation. These items shall be incidental to and included in the lump sum cost of this Traffic Signal System.

409.09.3 - Measurement for Traffic Signal Loops

The measurement for Traffic Signal Loops shall be on a PER EACH basis complete and in place.

409.09.4 - Payment for Traffic Signal Loops

Traffic Signal Loops shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install Traffic Signal Loops.

409.10 - Sprinkler System

409.10.1 - Measurement

The measurement for Sprinkler System shall be on a LUMP SUM basis complete and in place.

409.10.2 - Payment

Sprinkler System shall be paid at the Contract unit price bid on a LUMP SUM basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install the Sprinkler System including excavation and backfill of trenches for sprinkler lines and conduits, tapping of water mains, excavation and backfill for controller pedestal foundations and valve boxes, clean gravel for drainage, sleeves and concrete for controller pedestal foundations. These items shall be incidental to and included in the lump sum cost of this Sprinkler System.

409.11 - Street Monument

409.11.1 - Measurement

The various types of Street Monument shall be measured on a PER EACH basis. The measurement shall include the iron rod, plastic insulator, aluminum cap and if the street monument is for a control monument, it shall also include a PVC five (5) or six (6) inch sleeves and an aluminum box lid section complete and in place.

409.11.2 - Payment

The various types of Street Monument shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install the Street Monument at the locations as shown on the Plans or as directed by the City Engineer in accordance with the Standard Drawings.

409.12 - Modular Block Retaining Wall

409.12.1 - Measurement

Modular Block Retaining Wall shall be measured on a SQUARE FOOT basis. The measurement shall be along the top front edge of the wall and the height shall be total vertical wall height including the portion of the wall below ground surface.

409.12.2 - Payment

Modular Block Retaining Wall shall be paid at the Contract unit price bid on a SQUARE FOOT basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install the modular concrete block retaining wall at the locations as shown on the Plans and as directed by the City Engineer in accordance with the Standard Drawing, for Modular Block Retaining Wall. Concrete leveling pad, Geogrid reinforcement, aggregate base for backfill, Cover Coat Material for backfill, and related backfill compaction shall be included in the cost of the retaining wall and shall not be paid for separately.

409.13 - Landscaping

409.13.1 - Measurement for Landscaping

Landscaping shall be measured on a LUMP SUM or SQUARE YARD basis. The measurement shall be by the plan area of Landscaping complete and in place. The method of measurement shall be specified in the Contract Documents (LUMP SUM or SQUARE YARD).

409.13.2 - Payment for Landscaping

Landscaping shall be paid at the Contract unit price bid on a LUMP SUM or SQUARE YARD basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install Landscaping as shown in the Plans and as directed by the City Engineer.

409.13.3 - Measurement for Trees

Trees shall be measured on a PER EACH basis complete and in place.

409.13.4 - Payment for Trees

Trees shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install Trees as shown in the Plans and as directed by the City Engineer.

409.14 - Drain Rock

409.14.1 - Measurement

Drain Rock shall be measured on a CUBIC YARD basis in place on the project from field survey or photogrammetric cross sections, using the average end area method with no correction for curvature. Drain Rock may also be measured by the CUBIC YARD in place on the project from field survey or photogrammetric triangulation, using computer generated Triangulated Irregular Networks (TIN) surfaces. The City Engineer shall select which volume computation method is to be used.

409.14.2 - Payment

Drain Rock shall be paid at the Contract unit price bid on a CUBIC YARD basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install drain rock as shown on the Plans and as directed by the City Engineer.

409.15 - Riprap

409.15.1 - Measurement

Riprap shall be measured on a CUBIC YARD basis in place on the project from field survey or photogrammetric cross sections, using the average end area method with no correction for curvature. Riprap may also be measured by the CUBIC YARD in place on the project from field survey or photogrammetric triangulation, using computer generated Triangulated Irregular Networks (TIN) surfaces. The City Engineer shall select which volume computation method is to be used.

409.15.2 - Payment

Riprap shall be paid at the Contract unit price bid on a CUBIC YARD basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install Riprap as shown on the Plans and as directed by the City Engineer.

409.16 - Conduit

409.16.1 - Measurement

The various sizes and types of Conduit shall be measured on a LINEAR FOOT basis along the in-place conduit.

409.16.2 - Payment

The various sizes and types of Conduit shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be considered as full compensation for all labor, tools, materials and equipment necessary to supply and install Conduit. No separate payment shall be made for trenching, backfill, sand bedding, junction boxes, bends, plugs, fittings and all other materials and work as necessary for a complete installation.

409.17 - Silt Fence

409.17.1 - Measurement

Silt Fence shall be measured on a LINEAR FOOT basis along the top of the fence from center to center of end posts.

409.17.2 - Payment

Silt Fence and appurtenances shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to install silt fence complete and in place. The payment shall include the furnishing of fencing materials, connections and any other items required to install Silt Fence complete and in place.

409.18 - Casing Installation

409.18.1 - Measurement

The Installation of jacking/boring casing shall be measured by the LINEAR FOOT on a horizontal basis through the centerline of the casing pipe. Additional casing installed solely for the convenience of the Contractor will not be paid for but be considered incidental to Casing Installation.

409.18.2 - Payment

Casing Installation shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary for Casing Installation complete and in place. This item shall consist of the Contractor furnishing all tools, labor, materials and equipment necessary for excavating jacking/boring pits, designing jacking/boring

pit bracing, furnishing and installing casings, supplying and installing spacers, backfilling and compacting jacking/boring pits and reshaping and reseeded, where required, disturbed areas to the dimensions and locations shown in the Plans, as specified, and as directed by the City Engineer.

409.19 - Pipe Bursting

409.19.1 - Measurement

Regardless of the diameter of the pipe, Pipe Bursting shall be measured by the LINEAR FOOT complete and in place.

409.19.2 - Payment

Payment shall be made on a LINEAR FOOT basis for Pipe Bursting complete and in place. The payment shall be considered as full compensation for all labor, tools, materials, and equipment necessary to complete the work as shown in the Plans, as directed by the City Engineer, and as specified. No separate payment will be made for excavation of insertion or reception pits, trenching, replacing asphalt and aggregate base, camera inspections, modifications to existing manholes, removal and replacement of landscaping (including fences and sprinkler systems), removal and replacement of curb and gutter and sidewalk. This work shall be considered incidental to this item.

409.20 - Pipe Lining

409.20.1 - Measurement

Regardless of the diameter of the pipe, Pipe Lining shall be measured by the LINEAR FOOT complete and in place.

409.20.2 - Payment

Payment shall be made on a LINEAR FOOT basis for Pipe Lining complete and in place. Payment includes all compensation for providing all materials, labor, tools and equipment necessary to complete the work. No separate payment will be made for trenching, replacing asphalt and aggregate base, modifications to existing manholes or any other items specifically associated with Pipe Lining. These items shall be considered incidental to this pay item.

409.21 - Repair Sprinkler Systems

409.21.1 - Measurement

Measurement for Repair Sprinkler Systems shall be made on a LUMP SUM basis complete and in place.

409.21.2 - Payment

Payment for Repair Sprinkler Systems shall be made on a LUMP SUM basis and considered as full compensation for all labor, tools, materials and equipment necessary to remove and reinstall sprinkler systems as necessary, as shown in the Plans, as specified in these Special Provisions and as directed by the City Engineer. This item shall consist of the Contractor furnishing all tools, labor, materials and equipment necessary to remove and reinstall all sprinkler systems affected by construction, as necessary, as shown in the Plans, as specified, and as directed by the City Engineer.

409.22 - Cold Milling

409.22.1 - Measurement

Measurement for Cold Milling shall be made on a SQUARE YARD basis measured by the length and width of the roadway milled, complete and in place.

Measurement for EDGE TREATMENT shall be made on a LINEAR FOOT basis measured parallel to the centerline of the roadway complete and in place.

Measurement for END TREATMENT shall be made on a LINEAR FOOT basis measured tranverse to the roadway complete and in place.

409.22.2 - Payment for Cold Milling

Payment shall be made on a SQUARE YARD basis for COLD MILLING complete and in place. The payment shall be considered as full compensation for all tools, labor, materials, and equipment necessary to conduct Cold Milling as shown in the Plans as directed by the City Engineer, and as specified. There shall be no separate payment for removing mill tailings and/or disposing of them in an approved manner.

409.22.3 - Payment for Edge Treatment

Payment shall be made on a LINEAR FOOT basis for EDGE TREATMENT. The payment shall be considered as full compensation for all tools, labor, materials, and equipment necessary to construct Edge Treatment as shown in the Plans as directed by the City Engineer, and as specified. There shall be no separate payment for removing mill tailings and/or disposing of them in an approved manner.

409.22.4 - Payment for End Treatment

Payment shall be made on a LINEAR FOOT basis for END TREATMENT and considered as full compensation for all tools, labor, equipment and materials necessary to construct an End Treatment (Mill or Excavate) as shown in the

Plans, Standard Drawings Sheet Number 300-1 and as directed by the City Engineer.

409.23 - Handrail

409.23.1 - Measurement

Measurement for HANDRAIL shall be made on a LINEAR FOOT basis measured along the top of the finished rail complete and in place.

409.23.2 - Payment

Payment shall be made on a LINEAR FOOT basis for HANDRAIL and considered as full compensation for all tools, labor, equipment and materials necessary to construct Handrail (Aluminum or Galvanized Steel) as shown in the Plans, Standard Drawings Sheet Number 400-18 and as directed by the City Engineer.

409.24 - Bollard

409.24.1 - Measurement

Measurement for the various types of Bollard shall be made on a PER EACH basis complete and in place.

409.24.2 - Payment

Payment shall be made on a PER EACH basis for BOLLARD and be considered as full compensation for all tools, labor, equipment and materials necessary to supply and install Bollard as shown in the Plans, Standard Drawings Sheet Number 400-20 and as directed by the City Engineer.

409.25 - Parking Wheel Blocks

409.25.1 - Measurement

Measurement for Parking Wheel Blocks shall be made on a PER EACH basis complete and in place.

409.25.2 - Payment

Payment shall be made on a PER EACH basis for PARKING WHEEL BLOCKS and be considered as full compensation for all tools, labor, equipment and materials necessary to supply and install Parking Wheel Blocks.

409.26 - Storm Water Pollution Prevention Plan

409.26.1 - Measurement

Measurement for Storm Water Pollution Prevention Plan shall be made on a LUMP SUM basis complete and in place.

409.26.2 - Payment

Payment shall be made on a LUMP SUM basis for STORM WATER POLLUTION PREVENTION PLAN and be considered as full compensation for all tools, labor, equipment and materials necessary to implement, maintain and administer the plan.

**CITY OF IDAHO FALLS
PUBLIC WORKS DIVISION
ENGINEERING DEPARTMENT**

**STANDARD SPECIFICATIONS FOR
PORTLAND CEMENT CONCRETE
SECTION 500**

2010 EDITION

**STANDARD SPECIFICATIONS FOR
PORTLAND CEMENT CONCRETE
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**STANDARD SPECIFICATIONS FOR
PORTLAND CEMENT CONCRETE
2010 EDITION**

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PORTLAND CEMENT CONCRETE

SECTION 500

500 - INTRODUCTION

These Specifications cover the furnishing of Portland Cement Concrete and the placement thereof. All materials, workmanship and installation of the Portland Cement Concrete shall be supplied and done in accordance with these Standard Specifications, the Plans and Special Provisions or as directed in writing by the City Engineer. Any materials or installation not conforming to the requirements shall be removed and replaced or repaired to the satisfaction of the City Engineer at the Contractor's expense. No work shall be considered for acceptance until such repair or replacement is accomplished.

The terms "curb", "gutter", "combination curb and gutter", "valley gutter", "cross drains" and "alley gutters" in these Specifications shall be considered synonymous for items used for the direction control and conveyance of surface drainage and what applies to one shall apply to the others unless specifically designated otherwise. The terms "sidewalk", "driveway", "alley approach", "wheel chair ramp", and "miscellaneous concrete flatwork" in these Specifications shall be considered synonymous and what applies to one shall apply to the others unless specifically designated otherwise.

Specification references made herein for manufactured materials and installation procedures shall refer to designations of the American Association of State Highway and Transportation Officials (AASHTO), American Concrete Institute (ACI) and American Society for Testing and Materials (ASTM) as referenced in the latest edition on the date of Bid Opening. It is not intended that materials listed herein are to be considered equal or generally interchangeable for all applications. The City Engineer shall determine which materials are suitable for the Project and shall specify those materials in the Plans and/or Special Provisions.

The Contractor shall immediately submit written notice to the City Engineer of changes in site condition, which may require a change in the materials and/or installation procedures than those specified. Additional compensation shall not be awarded for any extra work resulting from such changed conditions unless prior to performing such extra work the Contractor shall have submitted written notice of the changed conditions to the City Engineer and the City Engineer shall have given written authorization of the extra work. If such changed conditions are for the convenience of the Contractor's operations, any and all additional costs associated therewith shall be at the expense of the Contractor.

All Portland Cement Concrete placed shall be Class 4 and shall have strength of four thousand (4,000) psi in twenty-eight (28) days unless otherwise shown in the Plans. The mix design for this Portland Cement Concrete shall be approved by the City Engineer. All concrete shall be cured by a LIQUID MEMBRANE-FORMING CURING COMPOUND method, unless otherwise specified herein and as directed in writing by the City Engineer.

501 - MATERIALS

501.01 - Portland Cement

Portland Cement shall conform to AASHTO M 85 and ASTM C 150, Type I, II, or III and shall not contain more than six-tenths (0.6) percent total alkali, unless otherwise specified. Prior written approval of the City Engineer will be necessary to use Type III cement in any construction other than precast stringers. The Contractor shall furnish a Certificate of Compliance, signed by the manufacturer, identifying the cement and stating that the cement complies with these specifications. All Portland Cement used in concrete for any individual structure shall be of the same brand and type unless otherwise approved in writing by the City Engineer. Whenever suitable facilities, approved by the City Engineer, are available for handling and weighing bulk cement, such facilities shall be used. Otherwise, the cement shall be delivered in original unopened sacks that have been filled by the manufacturer. They shall be plainly marked with the manufacturer's name or brand and cement type. Cement shall be stored in such a manner as to permit ready access for the purpose of inspection and sampling and with suitable protection against contamination or moisture. Should any cement delivered show evidence of contamination, or be otherwise unsuitable, the City Engineer may require that it be removed from the site. No cement shall be used in the work until it has successfully passed all the required tests and meets all other requirements specified. The City Engineer shall have the authority to require the reconstruction of any work utilizing cement which, when subsequently tested, is found to be not in conformance with the specified requirements.

501.02 - Fly Ash

Natural pozzolans and fly ash shall conform to AASHTO M 295 and ASTM C 618, except that loss on ignition (LOI) shall not exceed one and one-half (1.5) percent for all classes. The Contractor shall submit the manufacturer's certification of material class and conformance to material specifications.

Fly ash materials shall be protected from exposure to moisture until used. Containers used for transport or storage of fly ash shall be tightly sealed and adequately separated from other material containers to prevent seepage or mixing of materials. Equipment used for discharge of fly ash shall have positive shut-off controls at the point of discharge.

Fly ash used as a partial substitute for Portland Cement may cause a delay in strength gain and may require more curing time before the concrete is exposed to loading.

Fly ash materials may be accepted for use based on the manufacturer's certification as provided in Section 106, GENERAL CONDITIONS of the Standard Specifications.

501.03 - Aggregates for Concrete

Aggregates for concrete shall conform to the requirements and gradations prescribed herein and shall be approved in writing by the City Engineer prior to use. Any methods of handling materials that result in segregation or degradation, or the combining of materials that result in any stockpile failing to meet these Specifications shall not be permitted. Aggregates shall be reasonably free from wood, roots, bark, soft or disintegrated pieces or other detrimental matter. Blend sand may be approved for use to correct deficiencies in the gradation sizes provided the combination meets the specification requirements for the class of material being produced. A two (2) percent tolerance will be given for the percentage retained on the maximum size sieve for screen wear provided that one hundred (100) percent of the material passes the next larger sieve size. For specification requirements, the percent passing gradations shall be rounded to the nearest whole number.

501.03.1 - Fine Aggregate

Fine aggregate used in the manufacture of concrete shall conform to ASTM C33 with the following gradation:

Sieve Size	Percent Passing
3/8-Inch	100
No. 4	95 - 100
No. 16	50 - 85
No. 50	10 - 30
No. 100	2 - 10
No. 200	0 - 3
Sand equivalent shall be a minimum of seventy (70)	

For concrete pavements and concrete bridge decks the percent passing the number two hundred (No. 200) sieve size shall be zero - two (0-2), except that a maximum of three (3) percent passing will be accepted, if the sand equivalent is at least eighty (80). The amount of deleterious substances shall not exceed the following limits:

Material	Percent by Weight, Maximum
Clay Lumps	1.0
Coal and Lignite	1.0
All Other (Shale, Alkali, Mica, Coated Grains, Grains; Soft and Flakey Particles)	5.0

Organic impurities and mortar making properties shall conform to the requirements of AASHTO M 6. Limestone fine aggregate shall not be used in concrete wearing surfaces.

501.03.2 - Coarse Aggregate

Coarse aggregate used in the manufacture of concrete shall conform to ASTM C33 with the following gradations:

Sieve Size	Percent Passing Aggregate Size No.	
	57	67
1-1/2-Inch	100	
1-Inch	95 - 100	100
3/4-Inch		90-100
1/2-Inch	25-60	
3/8-Inch		20-55
No. 4	0-10	0-10
No. 8	0-5	0-5

Whenever possible the Aggregate Size Number 57 gradation shall be used to minimize shrinkage. An Aggregate Size larger than Number 57 may be used for structures and foundation bases (manholes or inlet boxes) with prior written approval of the City Engineer.

The amount of deleterious substances shall not exceed the following limits:

Material	Percent by Weight, Maximum
Soft Fragments	5.0
Coal and Lignite	1.0
Clay Lumps	0.25
Material Passing No. 200 Sieve (0.075 mm)	1.0
Thin or Elongated Pieces (Length greater than five (5) times average thickness)	15.0

The aggregate shall not show a loss of more than thirty-five (35) in the Los Angeles Abrasion Test.

501.04 - Water

Water for washing aggregates and for mixing concrete shall be clear and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious materials. Water from City mains, private wells, or other sources of potable water may be used in mixing concrete. The manufacturer, at his expense, when required by the City Engineer, shall have an independent testing laboratory analysis as to the quality of the water being used.

501.05 - Admixtures

Admixtures may be used only upon prior written approval of the City Engineer. Tests by an independent laboratory may be required to demonstrate the properties that an admixture will produce in the concrete. The type and extent of such tests will be set forth by the City Engineer upon receipt of written request from the Contractor to use an admixture. Some of the normally expected properties which admixtures may be expected to produce are entrained air, water reduction, acceleration of time of set, retardation of time of set and reduction of plastic shrinkage cracking. Any test required to demonstrate these or any other properties shall also show the strength producing characteristics of the admixture. It shall be the Contractor's responsibility to have the independent laboratory tests conducted, and the cost of such tests shall be borne solely by the Contractor.

501.05.1 - Air Entraining Admixtures

Air entraining admixtures shall conform to AASHTO M 154. When an air entrainment agent is used, it will be limited to the extent that the amount of entrained air by volume shall not exceed six and five-tenths (6.5) percent plus or

minus one and five-tenths (1.5) percent and the mix shall be designed to adjust the yield.

501.05.2 - Set Retarding Admixtures

Set retarding admixtures shall conform to ASTM C 494, Type B.

501.05.3 - Set Accelerators

When calcium chloride is permitted or required to accelerate setting time and to reduce the time necessary for the concrete to reach its specified strength, it shall conform to ASTM D 98. Under no circumstance will more than one (1) percent calcium chloride be allowed.

Patented accelerators, when permitted, shall be used strictly in accordance with the manufacturer's specifications.

Subject to the written approval of the City Engineer, Type III cement (high early strength) may be used in the same batch quantity specified for Type I or Type II cement.

501.05.4 - Water Reducing Admixtures

Water reducing admixtures shall conform to ASTM C 494, Type A and Type F.

501.05.5 - CFP Fibers

When CFP (collated fibrillated polypropylene) fibers are used, they shall conform to ASTM C 1116, Type III 4.1.3 and ASTM C 1116 Performance Level 1.

501.06 - Preformed Expansion Joint Filler

Preformed expansion joint filler shall conform to AASHTO M 153 or AASHTO M 213.

501.07 - Curing Materials

The method of cure shall be by a Liquid Membrane-Forming Curing Compound Method, unless otherwise designated. If required by the City Engineer, a manufacturer's Certificate of Compliance shall accompany membrane-forming curing compounds.

501.07.1 - Liquid Membrane-Forming Curing Compound for Horizontal Surfaces

Liquid membrane-forming curing compound for horizontal surfaces shall conform to ASTM C 1315, Type II, Class A or B (white pigmented). Water-based

(emulsified) liquid membrane-forming curing compound, shall be kept from freezing. Solvent based compounds shall not be mixed with emulsified compounds. It shall be applied to all horizontal or nearly horizontal concrete surfaces unless otherwise directed by the City Engineer.

501.07.2 - Liquid Membrane-Forming Curing Compound for Vertical Surfaces

Liquid membrane-forming curing compound for vertical surfaces shall conform to ASTM C 1315, Type I, Class A. Water-based (emulsified) liquid membrane-forming curing compound shall be kept from freezing. Solvent based compounds shall not be mixed with emulsified compounds. It shall be applied to all vertical or nearly vertical concrete surfaces unless otherwise directed by the City Engineer.

501.07.3 - Waterproof Paper

Waterproof paper shall conform to the requirements of AASHTO M 139. This method of cure shall not be used unless approved in writing by the City Engineer.

501.07.4 - White Polyethylene Sheeting

White Polyethylene Sheeting shall conform to the requirements of AASHTO M 171. This method of curing shall not be used without prior written approval by the City Engineer.

501.07.5 - Cotton Mats

Cotton mats shall conform to the requirements of AASHTO M 73, cotton mats for curing concrete. This method of curing shall not be used without prior written approval by the City Engineer.

501.08 - Metal Reinforcement Materials

501.08.1 - Reinforcing Steel

Welded Wire Fabric for Reinforcement shall conform to the requirements of AASHTO M 55. Unless otherwise specified, other reinforcing steel shall conform to the requirements of ASTM A 615, Grade 40 or 60. Epoxy coated metal reinforcement shall conform to AASHTO M 284.

501.08.2 - Dowel Bars

Dowel bars shall conform to AASHTO M 254, except the steel material may conform to AASHTO M 31 as an alternative. Dowel bars shall be smooth.

501.08.3 - Tie Bars

Tie bars shall conform to AASHTO M 31, Grade 40 or 60. Tie bars shall be deformed.

501.09 - Structural Steel

Unless otherwise specified, structural steel rolled shapes, plates, angles, etc. shall conform to ASTM A36. All structural steel elements that are not encased in concrete shall be given one (1) coat of Federal Paint Specification TT-P-615 Type II and one (1) coat of Federal Paint Specification TT-E-529, Class A. The color shall be approved by the City Engineer.

501.10 - Aggregate Base

Aggregate Base material shall meet the requirements of Aggregate Base in the Standard Specifications for Construction "Earthwork and Bases".

502 - EQUIPMENT

Mixing and transporting equipment shall be adequate in quantity to deliver the required amount of concrete to the job site. The rate of delivery shall be such that the concrete can be adequately handled, placed, and finished. Deliveries shall be made in a manner that will minimize repeated handling and prevent damage to the concrete previously placed. All equipment used in producing concrete shall be maintained in first class condition. Equipment deemed by the City Engineer to be inadequate to produce the quality of concrete required under these Specifications shall be removed from service until it is restored to its proper operational condition.

502.01 - Mixers and Agitators

Mixers may be stationary mixers or truck mixers. Agitators may be truck mixers or truck agitators meeting the requirements of AASHTO M 157 and ASTM C 94. Each mixer and agitator shall have attached thereto, by the Manufacturer, a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the volume of the drum, the capacity of the drum or container in terms of the volume of mixed concrete and the speed of rotation of the mixing drum or blades. Plates shall be in accordance with NRMCA Standards. Stationary mixers shall be equipped with an acceptable timing device that will not permit discharge until the specified mixing time has elapsed. Truck mixers shall be equipped with counters by which the number of revolutions of the drum or blades may be readily verified.

502.01.1 - Mixers

The mixers, when loaded to the rated mixing capacity and the concrete mixed for the time or revolutions prescribed, shall combine the ingredients of the concrete into a thoroughly mixed and uniform mass and discharge the concrete with satisfactory uniformity as required by these Specifications.

502.01.2 - Agitators

The agitators, when loaded to rated capacity, shall maintain the mixed concrete in a thoroughly mixed and uniform mass and discharge the concrete with satisfactory uniformity as required by these Specifications.

502.02 - Aluminum Pipe

Aluminum pipe shall NOT be used to convey concrete.

503 - CONCRETE

Portland Cement Concrete shall be proportioned and mixed in accordance with these Specifications, ACI 211, ACI 301 and shall be placed in reasonably close conformity with the lines and grades shown on the Plans or as approved in writing by the City Engineer. A copy of the delivery ticket for each load of concrete placed shall be furnished upon request to the City Engineer or his authorized representatives.

503.01 - Classification

503.01.1 - Standard Concrete Classes

The following classes of concrete shall be used where required in the Plans and/or as directed by the City Engineer:

Concrete Class In 1000 PSI (28 Day) ⁽¹⁾	Minimum Cement Content (LB/CY)	Maximum Water Cement Ratio (LB/LB)	Slump (Inches)	Air Content (%)
Class 6	700			0-6
Class 5	700	.44	4 Max	0-6
Class 4A ⁽²⁾	560	.44	2 ½ ±1.0	5.5 ±1.5
Class 4	610	.45	5 Max	6.5 ±1.5
Class 3	560	.53	5 Max	6.5 ±1.5
Class 2	470	.64	8 Max	0-6
Seal	660	.64	8 Max	0-6
Non-Shrink ⁽³⁾	50	.80	10 Max	0-10
⁽¹⁾ Classes of standard concrete are intended minimum compressive strengths when tested in accordance with the Section on TESTING.				
⁽²⁾ This class of concrete shall be used to place concrete by the extrusion method only.				
⁽³⁾ The maximum compressive strength of non-shrink concrete shall be 125 psi .				

503.01.2 - Fly Ash Concrete Classes

Unless otherwise directed by the City Engineer, fly ash concrete may be used at the Contractors option in place of conventional concrete classes listed in subsection 503.01.1. The following classes of fly ash concrete shall be used where required in the Plans and/or as directed by the City Engineer:

Concrete Class in 1000 PSI (28 Day)⁽¹⁾	Minimum Cement Content (LB/CY)⁽⁴⁾	Minimum Fly Ash Content (LB/CY)⁽⁴⁾	Water Cement Plus Fly Ash Ratio (LB/LB)	Maximum Slump (Inches)	Air Content (%)
Class 6F	467	116	.42	4 Max	0-6
Class 5F	467	116	.42	4 Max	0-6
Class 4AF ⁽²⁾	467	116	.42	2.5 ±1.0	5.5 ±1.5
Class 4F	467	116	.46	5 Max	6.5 ±1.5
Class 3F	467	116	.51	5 Max	6.5 ±1.5
Class 2F	392	98	.62	8 Max	0-6
Seal	550	138	.62	8 Max	0-6
Non-Shrink ⁽³⁾	37	10	.80	10 Max	0-10
⁽¹⁾ Classes of fly ash concrete are intended compressive strength when tested in accordance with the Section on TESTING.					
⁽²⁾ This class of concrete shall be used to place concrete by the extrusion method only.					
⁽³⁾ The maximum compressive strength of non-shrink concrete shall be 125 psi.					
⁽⁴⁾ It may not always be possible to produce concrete of the required strength using the minimum cement and fly ash contents. If additional cement and fly ash are needed to meet strength requirements, they shall be added at the ratio of one (1) pound fly ash per four (4) pounds cement. No separate payment will be made for additional cement and fly ash required to meet minimum strength.					

Cement factor and water cement ratio shall be determined using total weight of Portland Cement and fly ash.

Class F Fly Ash shall be used based on a replacement of one sixth (1/6) of the cement in non-fly ash concrete, at a ratio of one and one-quarter (1.25) pounds of fly ash per pound of cement replaced, with no increase in weight of water.

Unless otherwise provided, all concrete shall be Class 4F when fly ash concrete is permitted and shall have strength of four thousand (4,000) psi in twenty-eight (28) days.

503.02 - Proportioning

Concrete Mix Designs shall be proportioned in accordance with ACI 211. Submittals shall comply with the requirements of ACI 301. The Contractor shall submit a proposed concrete mix design to the City Engineer for approval prior to the start of any concrete work. Prequalified mix designs from each specific manufacturer shall be acceptable for use. Quality Control Charts from the concrete manufacturer will be considered, as adequate evidence that the proportions selected will produce concrete of the quality specified. In the absence of such evidence, the manufacturer or the Contractor shall be required to provide compressive test specimens made from the proposed mix design sufficiently in advance of any placement to allow for proper evaluation of test results. Test batching, sampling and specimen preparation shall be done in the presence of the City Engineer or his authorized representative.

The proportion of the ingredients for each batch (mix design) shall be reviewed by the City Engineer. The mix design shall include sufficient cement to ensure that the cement content will be within specification at maximum air content. For mixes where intended air content is zero, the mix design shall be based on an air content of two (2) percent. The proposed mix design shall be tested in accordance with applicable listed test procedures and AASHTO T126.

Basic mix strength may be determined by either of two methods:

1. Average of at least thirty (30) recent field production tests using the proposed mix design.
2. Average of three (3) laboratory prepared specimens made using the proposed mix design.

Basic mix strength shall equal or exceed the designated minimum strength multiplied by the appropriate factor from the following table. Class 2, seal and non-shrink concrete are exempt from this requirement.

Coefficient of Variation for Similar Mix in percent	5	10	15	20
Over design Factor for Conventional Concrete	1.13	1.21	1.31	1.42

NOTE: The coefficient of variation is a statistical measure of the variation in strength among specimens from a given plant. A mathematical definition appears in the ACI Manual of Concrete Practice, Sec. 214. A coefficient of variation of twenty (20) percent shall be assumed unless the supplier can demonstrate a record of sufficient testing to justify a lower coefficient. Do not interpolate. Round off coefficient of variation to nearest table value.

Recent concrete compressive strength test reports may be used to support mix designs in lieu of furnishing special samples and lab test reports. In the absence of such data, the Contractor shall furnish compressive test specimens made from the proposed mix design.

In an approved concrete mix design, fly ash may be used to replace up to twenty (20) percent of Portland Cement at a rate between one (1) pound and one and one-quarter (1.25) pounds of fly ash for each pound of Portland Cement replaced. Water cement ratio shall use the total weight of Portland Cement and fly ash.

The same fly ash source (power plant), cement source (mill), and cement type shall be used throughout the project in any individual mix design unless the City Engineer approves a change. Approval for a change may only be given upon submission of lab test reports by the Contractor to verify that the revised mix design meets all specification requirements.

When concrete is pumped, all field acceptance tests will be performed at the point of placement. Adjustments to basic mix proportions may be required to assure concrete meets the project specifications at the placement end of the line. Such adjustments shall be the Contractor's responsibility, and no separate payment will be made. The City Engineer shall be notified in writing prior to implementing such adjustments. Changes other than admixture dosage adjustments will require laboratory verification as a new mix design.

Proportioning as covered in these Specifications, deals primarily with the use of ready-mix concrete. For small isolated structures, concrete may be proportioned by volume and mixed by hand if the City Engineer grants such permission in writing. The City Engineer shall approve the proportion of the ingredients for each batch. The Contractor shall submit a proposed mix design to the City Engineer for approval.

All materials used in the manufacture of the concrete shall be proportioned by weight, except water, which may also be proportioned by volume if suitable equipment is used. All aggregates shall be proportioned by weight on a saturated surface-dry basis.

503.03 - Handling, Measuring and Batching Materials

503.03.1 - Cement

Cement shall be measured by weight or in sacks. When measured by weight, it shall be weighed on a scale separate from those used for other materials and in a hopper entirely free and independent of the hoppers used for weighing aggregates. The cement, as weighed, shall be within one (1) percent of the required weight. When cement is measured in sacks, no fraction of a sack shall be used unless weighed.

503.03.2 - Fly Ash

Fly Ash shall be measured by weight. It shall be weighed on a scale separate from those used for other materials and in a hopper entirely free and independent of the hoppers used for weighing aggregate. The fly ash, as weighted, shall be within one (1) percent of the required weight.

503.03.3 - Aggregates

Aggregates shall be measured by weight. The individual aggregates, as weighed, shall be within two (2) percent of the required weights and the total weight of the aggregate shall be within two (2) percent of the required weight.

Aggregates shall be handled from stockpiles or from other sources to the batching plant in such a manner as to maintain a uniform grading and stable moisture content of the material. All aggregates produced or handled by hydraulic methods and washed aggregates shall be stockpiled or binned for draining at least twelve (12) hours before batching.

503.03.4 - Water

Water shall be measured by volume or by weight. The measuring device shall be so arranged that variable pressures in the water supply line will not affect the measurements. Wash water shall not be used as a portion of the mixing water. Water, as weighed or measured, shall be within one (1) percent of the required amount.

503.03.5 - Admixtures

Dry admixtures shall be measured by weight, and paste or liquid admixtures by weight or volume. Admixtures used in small quantities in proportion to the cement, such as air entraining admixtures, shall be dispensed with the mixing water in accordance with manufactures recommendations. The quantities of admixtures used shall be within five (5) percent of the amount authorized.

503.03.6 - Transportation of Materials

If batches must be transported to the mixer, cement and aggregates shall be transported from the batching plant to the mixer in batch boxes, vehicle bodies, or other containers of adequate capacity and construction to properly carry the volume required.

503.04 - Mixing and Delivery

Truck mixers and truck agitators shall be operated within the rated capacity and at a speed of rotation for mixing or agitating as designated by the manufacturer of the equipment.

503.04.1 - Central-Mixed Concrete

Central-mixed concrete shall be mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in agitating equipment or in nonagitating equipment when approved in writing by the City Engineer. When a truck mixer is used for transporting central-mixed concrete, mixing during transport shall be at the agitating speed. Batch type mixers shall be so charged into the mixer that some water will enter in advance of cement and aggregates, and all water shall be in the drum by the end of the first one-fourth (1/4) of the specified mixing time. Mixing time shall be measured from the time all cement and aggregates are in the drum. Mixing time for batch mixers having a capacity of ten (10) cubic yards or less shall be fifty (50) seconds minimum. For ten (10) or more cubic yards capacity, the mixing time shall be approved in writing by the City Engineer.

Continuous type mixers that volumetrically measure the concrete ingredients and continuously produce concrete shall meet the requirements of ASTM C 685.

503.04.2 - Shrink-Mixed Concrete

Shrink-mixed concrete shall be mixed partially in a stationary mixer, and the mixing completed in a truck mixer. The mixing time in the stationary mixer may be reduced to a minimum of thirty (30) seconds. Mixing shall be completed in a truck mixer by not less than fifty (50), nor more than one hundred (100) revolutions of the drum or blades at mixing speed. The batch volume shall not exceed seventy (70) percent of the gross volume of the drum.

503.04.3 - Truck-Mixed or Transit-Mixed Concrete

Truck-mixed concrete shall be mixed completely in a truck mixer at the point of delivery following the addition of mixing water. Transit-mixed concrete shall be mixed completely in a truck mixer at the batching plant.

Each batch of concrete shall be mixed for not less than seventy (70) or more than three hundred (300) revolutions of the drum or blades at mixing speed in accordance with the requirements of ASTM C 94. Additional mixing, if any, shall be at mixing speed.

503.04.4 - Delivery by Truck Mixer or Agitator

When a truck mixer or agitator is used for delivering concrete, the concrete shall be delivered to the site of the work and discharge be completed within one and one-half (1-1/2) hours or before the drum has revolved three hundred (300) revolutions, whichever comes first, after the introduction of the cement to the aggregates. In hot weather, or under conditions contributing to quick stiffening of the concrete, a time less than one and one-half (1-1/2) hours may be directed by the City Engineer.

When a truck mixer is used for the complete mixing of the concrete, the mixing operation shall begin within thirty (30) minutes after the cement has been intermingled with the aggregates. If additional mixing water is added with permission of the City Engineer, a minimum of thirty (30) revolutions of the truck mixer drum at mixing speed shall be required before discharge of any concrete.

Tests for consistency shall be done in accordance with ASTM C 94.

503.04.5 - Delivery by Non-agitating Equipment

Central-mixed concrete may be transported in suitable nonagitating equipment. The bodies of such equipment shall be smooth, watertight metal containers capable of discharging the concrete at a satisfactory controlled rate without segregation. Covers shall be provided when required. Discharge shall be completed within forty-five (45) minutes after the introduction of the cement to the aggregates. Slump tests of the individual samples taken at approximately the one-fourth (1/4) and the three-fourths (3/4) points of the load during discharge shall not differ more than two (2) inches.

503.04.6 - Addition of Water

After the concrete is on the job, the Contractor shall be solely responsible for any water that may be added to reach the desired consistency (slump). The driver of the truck shall record the additional water added on his trip ticket and shall have the individual requesting the additional water sign the trip ticket. The batch plant shall be responsible to see that the concrete reaches the job site at or very near the required Specifications. At no time, without the express prior consent of the City Engineer or if specified in the Special Provisions, will concrete be placed with over a five (5) inch slump.

Any water to be added must be added prior to the commencement of the discharge of the concrete, and no concrete shall be discharged until the required mixing revolutions have been completed. No subsequent additional water may be added to the mix once the placement has commenced.

504 - TESTING

504.01 - Aggregate for Concrete

Aggregate tests shall be performed in accordance with the following Standard Test Methods:

Normal-weight Aggregates	ASTM C 33
Amount of material finer than the 0.075mm sieve in aggregate	AASHTO T 11
Sieve analysis of fine and coarse aggregates	AASHTO T 27
Plastic fines in graded aggregates and soils by use of the sand equivalent test	AASHTO T 176

504.02 - Concrete

Testing and evaluation of concrete shall be in accordance with the applicable standards and accepted practices of ACI and AASHTO. Acceptance of concrete is based on conformance with all parameters specified for the given concrete class. Acceptance of strength will be determined from the results of the twenty-eight (28) day compressive strength tests performed on cylinders made from samples of the concrete being placed. Average strength from two companion cylinders will be considered as one test.

Should the twenty-eight (28) day strength for any test for conventionally reinforced concrete for structures or paving concrete fall below the intended minimum strength, the concrete of that class represented by the test shall be subject to rejection or price adjustment if allowed to remain. Concrete subject to rejection or price adjustment shall be that represented by the test that falls below the intended minimum strength. A determination concerning acceptance of such low strength concrete shall be based on an evaluation of the necessary durability requirements and minimum design strength requirements of the concrete for the structure.

Conventionally reinforced concrete or paving concrete which fails to meet the intended minimum strength for the class required may be accepted at a reduced price provided the strength is not more than ten (10) percent below the intended minimum strength. Concrete of this type represented by tests falling more than ten (10) percent below intended minimum strength, is subject to rejection.

The price adjustment for conventionally reinforced concrete for structures or paving concrete, which fails to meet the intended strength, but is allowed to remain in place, shall be in accordance with the following table:

Percent of Specified Strength	Pay Factor
95 and above	1.00
90-94	0.80

The quantity of acceptable concrete will be paid for at the contract unit price multiplied by the pay factor as determined above.

Precast, prestressed and cast-in-place post-tensioned concrete shall meet the release strength and twenty-eight (28) day strength as shown on the Plans. Concrete which fails to meet these strengths, shall be cause for rejection of the member in which it is placed. The member may be core drilled to determine acceptance.

Concrete subject to price adjustment or rejection, may be core drilled as an alternative test for acceptance. Cost of obtaining and testing such core samples shall be borne by the Contractor when done at his request. The City Engineer shall determine the location of the cores, and the City Engineer shall witness coring and testing. Such cores shall be obtained and tested in accordance with AASHTO T 24.

If the concrete will be dry under service conditions, the cores shall be air dried between sixty to eighty (60-80) degrees Fahrenheit and at a relative humidity less than sixty (60) percent for seven (7) days before testing and shall be tested dry. If the concrete will be more than superficially wet under service conditions, the cores shall be tested after moisture conditioning in accordance with AASHTO T 24. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. If, before testing, one or more of the cores shows evidence of having been damaged subsequent to or during removal, it shall be replaced with a new core.

If the average strength of the cores from conventionally reinforced concrete or paving concrete is less than the intended minimum strength for the area represented, the concrete shall be removed or accepted at a reduced price, as specified above.

If the average core strength of the precast, prestressed or post-tensioned member is less than the required strength, the member shall be rejected and replaced with a new member at no cost to the City.

Should concrete used in the work fail to conform to intended minimum strength, the Contractor shall, at his expense, make corrective changes in the

materials mix portions, concrete fabrication procedures, or other corrective action before continuing. If results of seven (7) day strength tests are low or indicate a downward trend predicting concrete may not meet the specified twenty-eight (28) day strength, corrective changes shall be made. Changes will be subject to written approval of the City Engineer. Unacceptable concrete shall be removed at the Contractor's expense.

Testing shall be done in accordance with the following standard methods.

Air Content of Freshly Mixed Concrete by the Pressure Method	AASHTO T 152
Compressive Strength of Cylindrical Concrete Specimens	AASHTO T 22
Obtaining and Testing Drilled Cores and Sawed Beams of Concrete (If feasible, cores shall be a minimum four (4) inches in diameter)	AASHTO T 24
Making and Curing Concrete Test Specimens in the Laboratory	AASHTO T 126
Slump of Hydraulic Cement Concrete	AASHTO T 119
Mass Per Cubic Foot (Meter) , Yield, and Air Content (Gravimetric) of Concrete	AASHTO T 121
Sampling Freshly Mixed Concrete	WAQTC TM-2
Temperature of Freshly Mixed Portland Cement Concrete	AASHTO T 309

505 - CONSTRUCTION

505.01 - Forms

Forms shall be of suitable material and of a type, size, shape, quality and strength to insure that construction shall result in the specified thickness, cross section, grade, and alignment as shown on the Plans or Standard Drawings. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes that would deface the finished surface. Forms previously used shall be thoroughly cleaned of all dirt, mortar, and foreign matter before being reused. Where required, forms shall be constructed of or lined with materials approved in writing by the City Engineer. Forms used on surfaces exposed to public view shall be constructed and maintained in such a manner that an ordinary surface finish will provide a reasonably smooth surface of uniform color and texture. Forms shall be constructed as large as practicable to minimize form joints. No patches or repairs to forms will be permitted that will leave protrusions, or indentations in the finished concrete. Forms shall be so constructed that portions, where finishing is required, may be removed without disturbing portions of forms remaining in place.

Forms for any concrete work shall not be set in place until the subgrade has been properly graded and adequately compacted to within one (1) inch of its established grade. Forms shall be true to line and grade, mortar tight and adequately supported to prevent any deflection, settlement or movement during the placement of concrete. The responsibility for their adequacy shall rest with the Contractor.

Forms shall be constructed in such a manner that the finished concrete surfaces shall meet the requirements of the Section on FINISHING. Unless otherwise specified, all sharp edges shall be chamfered with one (1) inch by one (1) inch triangular fillets. Forms for curved surfaces shall be so constructed and placed that the finished surface will not deviate from the arc of the curve.

505.01.1 - Removal of Forms

The periods of time for form removal set forth herein are permissive only and subject to the Contractor assuming all risks that may be involved. Forms shall be left in place for a minimum of twelve (12) hours unless otherwise approved in writing by the City Engineer. At time of low temperature or other adverse conditions, the City Engineer may require the forms to be kept in place for longer periods of time. When forms are removed before the expiration of the curing period, the edges of the concrete shall be protected to assure moisture retention or sprayed with curing compound. The face form for curb sections shall be stripped at such time in the early curing period as will enable inspection and correction of all irregularities that appear thereon. All forms shall be cleaned, oiled, and examined for defects before they are used again.

Forms and falsework supporting concrete subject to direct bending stress shall be removed in accordance with the Section on FALSEWORK.

505.02 - Placing Concrete

Immediately prior to the placing of concrete, forms and metal reinforcement shall be carefully inspected for proper grade or elevation, alignment, and rigid construction. Adjustments and repairs shall be completed as needed before the placing of concrete. All dirt, chips, sawdust, nails, and other foreign material shall be completely removed from the inside area of the forms before any concrete is deposited therein. All inside surfaces of the forms shall be thoroughly treated with releasing agent that will leave no objectionable film on the surface of the forms that can be absorbed by the concrete. Care shall be exercised that no releasing agent is deposited on previously placed concrete and/or reinforcing steel. The subgrade shall be thoroughly dampened immediately prior to the placement of the concrete.

Concrete shall be placed as close to its final position as possible and in horizontal layers insofar as practical so as to avoid segregation of the materials and the displacement of any reinforcement. When placing operations would involve dropping the concrete more than five (5) feet, it shall be deposited through sheet metal or other tubes approved by the City Engineer. As far as practicable, the tubes shall be kept full of concrete during placing and their lower ends shall be kept buried in the newly placed concrete. The use of vibrators for extensive shifting of the mass of the concrete will not be permitted. Concrete shall be thoroughly spaded, tamped and vibrated into the forms to provide a dense, compacted concrete mass free of rock pockets and voids.

Placing shall start at the low point and proceed up grade unless otherwise permitted in writing by the City Engineer. Concrete shall be placed in a continuous operation between construction joints and shall be terminated with square ends and level tops unless otherwise shown on the Plans. The rate of concrete placement shall not exceed the rate at which the various placing, floating and finishing operations can be performed in accordance with these Specifications.

After initial set of the concrete, the forms shall not be jarred and no strain shall be placed on the ends of projecting reinforcement. Concrete that has partially hardened, has been retempered, or is contaminated by foreign materials, shall not be deposited in the structure.

If the concrete is to be placed by the extrusion method, the Contractor shall demonstrate to the City Engineer that the machine is capable of placing a dense, uniformly compacted concrete to the exact cross section, line and grade established. The City Engineer shall then certify in writing that the machine meets those requirements of construction as established in these Specifications.

This certification shall be issued prior to the machine being permitted to place concrete in the public rights-of-way.

The concrete for sidewalk, driveways, and alley approaches and other such concrete flatwork shall be spread uniformly between the forms and thoroughly compacted with an approved type of strike board. JITTER-BUG TYPE TAMPERS SHALL NOT BE ALLOWED.

505.03 - Cold Weather Concreting

If the Contractor desires to place concrete at any time the mean temperature is expected to fall below forty (40) degrees Fahrenheit , placement shall conform to ACI 306R and the following provisions. The Contractor must give written notification to the City Engineer of his intentions to place concrete, giving nature of work, time and locations. The Contractor shall assume all responsibility for any damage to the concrete that may be caused by freezing, or any other cause, even though permission to proceed with said work may have been given by the City Engineer. Failure to comply with this will be cause for rejection of any or all of said work.

During cold weather concreting, the Contractor may be required to furnish, in good working order, an adequate number of calibrated recording thermometers with the range of zero (0) degrees Fahrenheit to two hundred twelve (212) degrees Fahrenheit as determined by the City Engineer. Each individual recording thermometer shall be capable of recording temperatures on a chart continuously for not less than twenty-four (24) hours. Each of these thermometers shall be placed at the location of the concrete work by the Contractor as directed by the City Engineer.

505.03.1 - Heating and Placing Concrete

The Contractor shall make all provisions necessary at the job site to protect his work from the elements. Before any concrete is placed, all ice, snow and frost shall be completely removed. Concrete operations shall meet the following requirements when the ambient temperature falls below forty (40) degrees Fahrenheit:

1. The Contractor shall furnish concrete that will have a temperature of at least fifty (50) degrees Fahrenheit and not more than eighty (80) degrees Fahrenheit at the time of placing.
2. Heating equipment shall heat the materials uniformly. Such heating shall preclude the occurrence of nonuniform moisture contents or contamination in the aggregates.

3. Aggregates shall be heated in a manner such that frozen lumps, ice, and snow are eliminated. The average temperature of an individual batch of aggregate shall not exceed one hundred fifty (150) degrees Fahrenheit.

505.03.2 - Protection of Concrete

The temperature of the concrete shall be maintained at a minimum of fifty (50) degrees Fahrenheit for seven (7) days or seventy (70) degrees Fahrenheit for three (3) days after placement, except when steam curing is used. Where unformed surfaces of concrete such as decks or sidewalks are involved, the temperature at the surface shall be maintained at the temperatures and times as set forth above.

Concrete may be protected and cured under water provided that the temperature of the water does not fall below thirty-five (35) degrees Fahrenheit, and at least six (6) inches of water is maintained over the concrete for a minimum of ten (10) days.

Combustion heaters shall be blocked up off the surface of the concrete and vented to the outside of the enclosure.

For protection methods, other than the use of steam, the maximum temperature within the enclosure shall not exceed one hundred twenty (120) degrees Fahrenheit. The maximum drop in temperature of the concrete throughout the first twenty-four (24) hours after the end of protection shall be fifty (50) degrees Fahrenheit.

When steam is used in the protection of the concrete, the method shall conform to the requirements of the Section on STEAM CURE. The Contractor shall furnish calibrated recording thermometers with the range of zero (0) degrees Fahrenheit to two hundred twelve (212) degrees Fahrenheit. Temperatures shall be recorded on a chart continuously for not less than twenty-four (24) hours. A sufficient number of recording thermometers shall be furnished by the Contractor as required by the City Engineer to keep adequate records of temperatures.

On small quantities of concrete used in minor structures, sidewalks, curb and gutter, etc., the Contractor shall protect the concrete from freezing damage (temperatures below thirty-two (32) degrees Fahrenheit) by covering the concrete with an approved material. Such material shall be approved by the City Engineer. The Contractor shall maintain such protective covering for a minimum of three (3) days.

505.04 - Hot Weather Concreting

The temperature of concrete shall not exceed eighty (80) degrees Fahrenheit at time of placement and shall be in accordance with ACI 305. When

the combination of ambient air temperature, concrete temperature, humidity and wind is such that rapid evaporation of moisture from the concrete surface will likely take place, the Contractor shall take measures to slow evaporation to tolerable limits as per ACI 305 or as directed by the City Engineer. Such measures may include, but are not limited to, erecting wind and/or sunshades or placing concrete at night or early morning. Ice may be used as part of the mixing water; provided that it has completely melted by the time mixing is completed.

505.05 - Joints

505.05.1 - Expansion Joints

Expansion joints shall be constructed in accordance with these Specifications and the Standard Drawings unless otherwise specified on the Plans or designated by the City Engineer. All expansion joints shall be filled with preformed expansion joint filler. These expansion joint filler strips shall be installed vertically and shall extend to the full depth and width of the concrete work in which they are installed. They shall be installed perpendicular to straight sections and radially on a curve. Expansion joint filler material shall completely fill the joint area to within one-quarter (1/4) inch of any surface of the concrete. Excess filler material shall be trimmed off to the specified dimensions of the concrete work in a neat and workmanlike manner. During the placing and tamping of the concrete, the filler strip shall be held rigidly and securely in its proper position.

505.05.2 - Weakened-Plane Joints (Contraction Joints)

Weakened-plane joints shall be straight and shall be constructed in accordance with these Specifications unless otherwise shown on the Plans or designated by the City Engineer. Weakened-plane joints in straight sections shall be transverse to the line of work. Around curves, walk returns, etc. the joints shall be radial.

505.05.3 - Construction Joints

Construction joints shall be made only where located on the Plans unless otherwise approved in writing by the City Engineer. If not detailed on the Plans, or in the case of emergency, construction joints shall be placed as directed. Shear keys or inclined reinforcement shall be used where necessary to transmit shear between sections.

Before depositing concrete on or against hardened concrete, the surface of the hardened concrete shall be roughened in a manner that will not leave loosened particles of aggregate or damaged concrete at the surface. It shall then be thoroughly cleaned of foreign matter and laitance, and saturated with water.

505.06 - Finishing

After the concrete has been placed and consolidated, the exposed concrete surfaces shall be finished true to the established line, grade and cross section within the following tolerance limits:

The vertical alignment or grade of the finished concrete work shall not deviate more than one-eighth (1/8) inch in ten (10) feet from the established profile grade and the horizontal alignment of the finished concrete work shall not deviate more than one-fourth (1/4) inch in ten (10) feet from the alignment shown on the Plans or established by the City Engineer.

Any cross sectional dimensions or measurements (i.e., depth, width, curb face batter, curb top radius, flow line radius, etc.) of any concrete member or element shall not vary more than one-fourth (1/4) inch from the approved typical cross section dimensions for the member or element; provided, however, that ninety (90) percent of the depth and/or width measurements of any fifty (50) foot length of the member or element shall be equal to or greater than the specified Plan (typical cross section) depth and width dimensions.

The Contractor shall furnish a ten (10) foot long straightedge to check the finished concrete work for conformance with the required tolerances. It shall be at the site of the work prior to the placing and finishing of the concrete work.

All concrete surfaces shall be checked by the Contractor for conformance with the dimensions, elevations and alignment shown on the Plans. Any surface not conforming to such dimensions, elevations, or alignment within the tolerances listed above shall be corrected so that it is within the acceptable limits or it shall be removed and replaced at the Contractor's expense. Any concrete work having unsightly bulges, ridges, low spots or other finishing defects shall be removed and replaced at the Contractor's expense.

The sequence and timing of the finish work shall be such that a hard, durable, nonporous surface is obtained throughout. The workmanship or quality of the concrete surface finish shall not be less than that designated herein or as approved in writing by the City Engineer. Concrete edging and/or jointing shall be done at such times and in such manner that the edges and/or joints are not "rolled" or depressed below the projected plane of the rest of the concrete surface.

JITTER-BUG TYPE TAMPERS ARE NOT APPROVED FOR USE IN ANY TYPE OF CONCRETE WORK.

505.06.1 - Protection of Finished Concrete

The Contractor shall continuously and conscientiously protect the new concrete from any type of damage or vandalism. The Contractor shall provide all

barricades, fences, ropes, pedestrian bridges, personnel, etc. required to protect the freshly placed concrete from damage or defacement by pedestrians, dogs, vehicles, etc. and shall not begin any concrete placement until such protective devices and personnel are on hand at the project site. Any concrete that is damaged, marred or defaced in any manner shall be removed and replaced by the Contractor at no cost to the City.

505.07 - Curing Concrete

All concrete shall be cured by a LIQUID MEMBRANE-FORMING CURING COMPOUND method, unless otherwise specified herein or designated in writing by the City Engineer. All concrete surfaces shall be kept completely and continuously moist until a curing method is applied. On exposed unformed concrete surfaces, such as slabs or sidewalks, windbreakers or covers may be required to protect the concrete from the drying effect of wind.

505.07.1 - Water Cure

The surface of the concrete to receive a water cure shall be properly finished and kept continuously wet for a period of at least five (5) days except for decks, curbs, approach slabs, and sidewalks on bridges that shall be kept continuously wet for seven (7) days. When concrete is to be cured without the use of moisture retaining medium, the entire surface of the concrete slab shall be kept damp by the application of water with an atomizing nozzle that so atomizes the flow that a mist and not a spray is formed, until the surface of the concrete is covered with the curing medium. The moisture from the nozzles shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate on the concrete in a quantity sufficient to cause a flow or wash the surface. After the concrete has set, the entire surface of the concrete shall be sprinkled continuously with water until completion of the required curing period.

Cotton mats, rugs, carpets, burlap, visqueen or sand blankets may be used as a curing medium to retain the moisture during the curing period. When such items are to be used, the entire surface of the concrete shall be kept damp by applying water with a nozzle as specified in the preceding paragraph. At the completion of the required curing period, the concrete surfaces shall be cleared of all curing mediums. In lieu of the atomized water, the Contractor may use curing compound approved in writing by the City Engineer or surface film protection prior to covering with the curing medium.

Prior to placement of concrete, the Contractor shall demonstrate that he has the capability of providing the water cure as specified. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concreting operations.

505.07.2 - Liquid Membrane-Forming Curing Compounds

Membrane-forming curing compounds shall be thoroughly mixed before use and agitated during the application to prevent settling of the suspended solids. During curing operations, all unsprayed exposed surfaces shall be kept wet with water. The curing compound shall be applied under pressure by means of a spray nozzle, in such manner and quantity as to entirely cover all exposed surfaces of the concrete with a uniform film. The curing compound shall be applied in sufficient quantity to obscure the natural color of the concrete. Additional coats shall be applied if the City Engineer determines that the coverage is not adequate. All exposed surfaces of the concrete shall receive the same attention.

Membrane-forming curing compound shall not be applied to concrete surfaces before the finishing has been accepted and shall not be applied to construction joints nor to the inside faces of the joints to be sealed. The curing compound, on unformed concrete surfaces, shall be applied just after the bleed water or free water sheen disappears from the finished concrete surface.

Prior to the completion of the seven (7) day curing period, if any membrane surface is marred or damaged by scuffing and wear or the removal of forms exposes any uncured surface, the Contractor shall immediately apply the same type membrane to the damaged or exposed surface.

When LIQUID MEMBRANE-FORMING CURING COMPOUND FOR HORIZONTAL SURFACES is used, it shall be applied under pressure, which will result in a coverage equaling at least one (1) gallon per one hundred fifty (150) square feet. The rate of application shall be such that the compound forms a continuous, unbroken film when applied to the concrete surface.

When LIQUID MEMBRANE-FORMING CURING COMPOUND FOR VERTICAL SURFACES is used, it shall be applied under pressure, which will result in a coverage equaling at least one (1) gallon per two hundred (200) square feet. The rate of application shall be such that the compound forms a continuous, unbroken film when applied to the concrete surface.

505.07.3 - Steam Cure

When steam curing is used, there shall be a minimum two (2) hour period through which the concrete is protected within a temperature range of fifty (50) degrees Fahrenheit to one hundred (100) degrees Fahrenheit. Following this initial period, the temperature shall be increased at a maximum rate of forty (40) degrees Fahrenheit per hour, to a temperature between one hundred (100) degrees Fahrenheit and one hundred seventy-five (175) degrees Fahrenheit. Curing at this temperature shall continue until cylinder strengths are above the release strength for prestressed reinforced concrete or about eighty (80) percent of the intended twenty-eight (28) day strength, whichever is greater.

Upon completion of the cure cycle, when ambient air temperatures are below forty (40) degrees Fahrenheit, the concrete shall be cooled gradually by decreasing its temperature at a rate not to exceed forty (40) degrees Fahrenheit per hour until the temperature differential between the concrete and outside air does not exceed twenty-five (25) degrees Fahrenheit. No concrete shall be exposed to below freezing temperatures until at least six (6) days after fabrication or until the twenty-eight (28) day strength has been achieved.

505.08 - Construction Activity Adjacent to New Concrete Work

No power equipment (i.e., motor graders, compactors, etc.) used in the preparation of the subgrade or base gravel shall be permitted to operate adjacent to any newly constructed concrete until the fourth (4th) day following the placement of the concrete.

Any paving operations adjacent to newly constructed concrete shall not be permitted until the seventh (7th) day following the placement of the concrete. The excavated areas immediately behind such newly constructed concrete shall be backfilled and compacted to minimize the possibility that the construction equipment working in the area may displace these concrete facilities.

If Class 4A (extruded) concrete is used for curb and gutter construction, power equipment shall be permitted to operate adjacent to the newly constructed curb and gutter on the third (3rd) day following the placement of this class of concrete.

505.09 - Repair of Concrete

Any repair of concrete shall be performed only when approved in writing by the City Engineer. The Contractor shall inform the City Engineer of the date and time of repair and such repair shall be performed only in the presence of the City Engineer or his authorized representative.

The Contractor shall correct all imperfections on the concrete surfaces as necessary to produce a surface that conforms in appearance to the adjoining concrete. Unless otherwise approved by the City Engineer, repair of imperfections in formed concrete shall be completed within twenty-four (24) hours after the initial removal of the forms. Fins and incrustations shall be neatly removed from surfaces exposed to permanent view. Concrete that is damaged from any cause and concrete that is honeycombed, fractured, or otherwise defective, and concrete which because of excessive surface depressions must be excavated and built up to bring the surface to the prescribed lines, shall be removed and replaced with dry pack mortar or concrete as specified in writing by the City Engineer.

505.10 - Backfilling and Clean Up

Backfilling to the finished surface of the newly constructed concrete improvements must be completed before acceptance of the work. Upon completion of the work, the surface of the concrete shall be thoroughly cleaned and the site left in a neat and orderly condition.

506 - METAL REINFORCEMENT

This work shall consist of furnishing and placing reinforcing steel in accordance with these Specifications and in reasonably close conformity with the Plans or as directed in writing by the City Engineer.

506.01 - Construction

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 structural drawings and make any necessary corrections before ordering. Errors in the bar list and bending schedule shall not be cause for adjustment of Contract unit price.

Steel reinforcement shall be protected at all times from damage. When placed in the work, it shall be free from dirt, detrimental scale, paint, oil, or other foreign substances. All bars in any individual structure or member shall be the same grade unless otherwise permitted in writing by the City Engineer.

506.01.1 - Bending

Bends and hooks in bars shall be made in the manner prescribed on the Plans or as directed in writing by the City Engineer. Bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks or unspecified bends shall not be used.

When bars are heated for bending, they shall be heated to a temperature between one thousand (1,000) degrees Fahrenheit to one thousand one hundred (1,100) degrees Fahrenheit. Torch tips designed for flame cutting shall not be used; only those with rosebud type tips, designed to give a defused flame, are permitted. Bars shall not be heated for bending when the ambient temperature is less than fifty (50) degrees Fahrenheit or wind velocity at the bending site exceeds fifteen (15) miles per hour. Bars that have been heated for bending shall not be artificially cooled or placed on the ground or on a concrete floor for cooling.

506.01.2 - Support

During the placing of concrete, reinforcing steel shall be firmly held in position as shown on the Plans. Placing bars on layers of fresh concrete, as the work progresses and/or adjusting bars during the placing of concrete will not be permitted. No concrete shall be deposited until the placement of the reinforcement steel has been inspected and approved. Reinforcement positions shall be maintained by means of stays, blocks, ties, hangers, or other supports approved in writing by the City Engineer. The supports for metal reinforcement shall not be spaced more than four (4) feet apart transversely or longitudinally.

If concrete blocks are used, they shall have appropriate tie wires imbedded in them during their forming stage and each block shall be tied to the reinforcing bar it supports, to hold the block in place. Concrete blocks shall have approximately the same strength quality as the concrete placed around them. Plastic coated tie wire will only be required when epoxy coated reinforcing steel is specified for bridge decks. Alternate methods of holding the concrete blocks in place may be approved. The use of pebbles, pieces of broken stone, concrete or brick, metal pipe or wooden blocks will not be permitted.

Reinforcement in any individual structure or member shall be placed, inspected and approved before any concrete is placed. Concrete deck reinforcing steel shall not deviate more than plus or minus one-quarter (1/4) inch in the vertical direction from the position shown on the Plans.

Welded wire fabric shall be placed in the bottom of the forms prior to placement of the concrete. It shall be lifted carefully into its specified position after the concrete is placed, but still plastic.

506.01.3 - Ties and Welding

Reinforcing bars shall be tied at all intersections except where spacing is less than one (1) foot in each direction, when every other intersection shall be tied. Welding of stressed reinforcing steel may be permitted only if such welding conforms with AWS D-12.1, "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction." Where bundled bars are shown on Plans, bundles shall be tightly tied at intervals not exceeding three (3) feet with number sixteen (No. 16) black or plastic coated steel wire or larger.

506.01.4 - Splices

Reinforcement shall be furnished in the full length indicated on the Plans. No splicing of bars, except where shown on the Plans, will be permitted without written approval from the City Engineer. Where bars are spliced, they shall be lapped at least thirty (30) bar diameters unless otherwise shown on the Plans. The bars shall be rigidly clamped or wired at all splices in a manner approved by the City Engineer. Welded wire fabric shall be spliced not less than two (2) meshes.

507 - CURBS, GUTTERS, SIDEWALKS, APPROACHES AND MISCELLANEOUS FLATWORK

This section covers the requirements for the construction of concrete curbs, gutters, alley gutters, combination curb and gutter, valley gutters, cross drains, sidewalks, driveways, alley approaches and any other such miscellaneous concrete flatwork as may be shown on the Plans or designated to be constructed under this Section. All work performed under this section shall meet the requirements in the section on CONCRETE, unless specified otherwise.

507.01 - Grading and Compacting

All excavation, embankment construction, grading, and compaction work shall be done in accordance with the applicable requirements of the Standard Specifications. The subgrade for any of this work shall be compacted to such extent that it conforms to the requirements for Class "A" Compaction unless otherwise specified on the Plans or in the Special Provisions.

507.02 - Forms

507.02.1 - Curb and Gutter

Curb and gutter shall be constructed in uniform sections ten (10) feet in length except where shorter sections are necessary for closures or on curves, but no section shall be less than four (4) feet long. Where a curb and gutter section must be constructed on a curve, straight lengths of the section shall be short enough that the middle ordinate to the curve from the face of the section does not exceed one-quarter (1/4) inch or the section shall be continuously curved. The curb face form shall be cut to conform exactly to the curb face batter and curvature shown on the Plans or Standard Drawings.

Sections shall be separated by steel "skeleton" templates conforming to the typical cross section of the gutter, set perpendicular to the face and top of the curb and held securely in position so as not to become displaced during placing of concrete. Templates shall be thoroughly cleaned and oiled before using. The templates shall not be less than one-eighth (1/8) inch nor more than three-sixteenth (3/16) inch in thickness and shall be of "skeleton type." The templates shall be left in place until the concrete has set sufficiently to hold its shape, after which they shall be carefully removed without injury to or marring of the concrete. Immediately after removal of the templates, the joints shall be lightly tooled along the face and top of the curb.

507.02.2 - Sidewalks, Approaches and Miscellaneous Flatwork

All sidewalks shall be at least four (4) inches thick and at least five (5) feet wide unless otherwise shown on the Plans and approved by the City Engineer. "Residential" driveways shall have a concrete thickness of not less than four (4) inches and need not be reinforced with reinforcing steel. "Commercial" driveways and alley approaches shall have a concrete thickness of not less than six (6) inches and shall be reinforced with reinforcing steel. Driveway layout, concrete depths, amount of reinforcing steel, etc. shall be in accordance with the Plans and Standard Drawings.

The top edge of any sidewalk immediately adjacent to a curb shall be one-quarter (1/4) inch higher than the top of said adjacent curb. The finished surface of any sidewalk shall slope upward from a point that is one-quarter (1/4) inch above the top of the adjacent curb at a rate of one-quarter (1/4) inch of vertical rise for every one (1) foot of horizontal distance measured at right angles from the curb line. The back-of-walk shall always be parallel with and higher than the theoretical top-of-curb by the amount of slope indicated above.

The slope of driveways and alley approaches shall be such that they slope uniformly from the elevation of the back-of-walk (as established above) downward to a point that is one-quarter (1/4) inch higher than the top of the depressed back-of-curb section. Depressed curb sections for individual driveway and alley approaches shall be provided in the new curb and gutter at existing driveway and alley locations, at the locations shown on the Plans and at such other locations as may be designated by the City Engineer. The length and physical configuration of the depressed curb sections for driveway or alley approaches shall be as shown on the Plans or the Standard Drawings.

The Contractor shall construct depressed curb and sidewalk areas at the corners of all intersections to accommodate handicapped pedestrians. These depressed curb and sidewalk areas (for the handicapped) shall be constructed in accordance with Americans with Disabilities Act, the Standard Drawings and/or as directed in writing by the City Engineer.

507.02.3 - Slip Forms or Extruders

Slip form equipment or curb and gutter extruders may be used for the construction of concrete curb and gutter. Such equipment shall be provided with traveling side and top forms of suitable dimension, shape and strength to support the concrete for a sufficient length of time during and after placement to produce curb and gutter of the required cross section. Equipment shall spread, consolidate, and screed, or extrude the freshly placed concrete in such a manner as to provide a dense and homogeneous product. The slip form equipment or concrete curb and gutter extruder shall have automatic sensor controls which

operate from an offset control line. The line and grade of the slip form or concrete extruding equipment shall be automatically controlled. The machine shall be mounted on casters or wheels that can be steered.

507.03 - Joints

507.03.1 - Expansion Joints

Expansion joints shall be located along all building faces; at locations where sidewalk, driveways, alley pads, etc. intersect one another at an angle, on both sides of alley or driveway approaches, at the joints isolating traffic signal or light pole foundations, at joints of newly constructed concrete abutting existing concrete, at and around utility poles and fire hydrants and at other locations designated in writing by the City Engineer. Expansion joints shall be constructed in the curbs and gutters, sidewalks and driveway approaches only as shown on the Standard Drawings or as may be designated in writing by the City Engineer.

The edge of the concrete at all expansion joints shall be edged with a one-quarter (1/4) inch radius edging tool. The final marking of the joint shall be accomplished with a marking tool having a width of at least one and one-half (1-1/2) inches after the final broom finish as been completed.

507.03.2 - Weakened-Plane Joints (Contraction Joints)

Weakened-plane joints in sidewalk, approaches and miscellaneous flatwork shall be spaced at regular intervals approximately equal to the normal width; but in no case shall these joints be less than five (5) feet nor more than ten (10) feet apart unless specifically shown otherwise on the Plans. Where concrete curb and gutter is adjacent to sidewalk, driveways, or concrete pavement, the joints of the various adjacent facilities shall be aligned wherever practical.

After the surface of the concrete has received its preliminary floating and trowelling, the concrete surface shall be parted to a depth of at least one-quarter (1/4) of the total depth of the member or element with a steel plate, jointing tool, or other similar approved device to create a definite weakened division or plane in the coarse aggregate. The exposed concrete surface shall then be refinished to fill the parted joint with mortar. Weakened-plane joints may also be constructed utilizing either removable or "leave in place" plastic templates or strips as approved by the City Engineer.

Joints in formed gutters shall be at the location of the form templates. Immediately after removal of the templates, the joints shall be lightly tooled along the face and top of the curb and along the top of the gutter with a one-eighth (1/8) inch jointer tool.

Joints in extruded concrete gutter shall be parted, cut or sawed in uniform sections ten (10) feet in length to a depth of at least two (2) inches with a steel

plate, jointing tool, or other similar device to create a definite division or plane of weakness in the coarse aggregate. The exposed concrete surfaces shall then be trowelled smooth to fill the parted joint with mortar.

All preliminary joints shall be clearly marked so that the weakened-plane can be easily and accurately relocated for the final joint finishing. Final joint finishing shall be accomplished with a jointer tool having a depth of at least three-quarters (3/4) inch and a radius of one-eighth (1/8) inch. The finished joint opening, exclusive of radii, shall not be wider than one-eighth (1/8) inch. Particular care shall be given to the final joint finishing and marking so that all joints are left flush with the rest of the finished concrete surface. The final marking of any joint shall be accomplished with a marking tool having a width of at least one and one-half (1-1/2) inches, after the final broom finish has been completed.

507.04 - Finishing

507.04.1 - Curb and Gutter

The face form of cast-in-place concrete curb and gutter shall be stripped as soon as the concrete has set sufficiently and the curb face and top smoothed free of all form marks and irregularities. All other exposed portions of any gutter shall also be smoothed free of all form marks or irregularities while the concrete is still green. Honeycombed areas in the back of the curb, which, in the opinion of the City Engineer, are not detrimental to the curb, need not be patched.

The back edge of the curb and the formed edge(s) of the various types of gutter shall be rounded with an edge of one-quarter (1/4) inch radius. The face and top of the curb shall be carefully trowelled to a smooth, even finish conforming to the established typical cross section. The gutter surface and the gutter flowline shall be carefully worked or trowelled to a true and even grade (both transversely and longitudinally) conforming to the established typical cross section and then finished to a smooth, even texture with a trowel. The surface of the curb and gutter shall then be finished with a fine hair broom applied parallel to the line of the work.

When checked with water, any gutter whose flow line has water ponds or puddles therein of a depth equal to or greater than one-quarter (1/4) inch, after the water has stopped flowing down said gutter line, shall be deemed unacceptable without further checking. The use of water for checking the flow line of the concrete work shall be considered as a preliminary check only. Any concrete work so tested shall still be subject to further testing to determine its compliance with the various other dimensional and quality requirements set forth herein.

507.04.2 - Sidewalks, Approaches and Miscellaneous Flatwork

Following its proper placement and consolidation, the concrete shall be screeded and worked to a true, even grade free from all waves and irregularities. A thin layer of mortar shall be brought to the surface. The surface shall then be floated and trowelled as required to provide a smooth, flat, uniform surface. All formed edges shall be rounded to a radius of one-quarter (1/4) inch. After the edging and trowelling is completed, all exposed surfaces shall be finished with a fine hair broom applied transversely to the adjacent curb line or as directed by the City Engineer. The broom finish shall be rough enough so it provides a "non slippery" surface for pedestrian usage, but not so rough that it is hard to clean or uncomfortable to walk on. The City Engineer shall approve the roughness of the finish in writing.

All edge lines shall be remarked with a marking tool having a width of at least one and one-half (1-1/2) inches, after completion of the final finish and brooming to assure neat, uniform edge lines.

507.05 - Curing

Immediately after the finishing operations on any new concrete work are complete, a curing compound meeting the requirements of the Section on LIQUID MEMBRANE-FORMING CURING COMPOUNDS FOR HORIZONTAL SURFACES shall be applied to any of the exposed surfaces of the concrete work in accordance with the application rate and requirements of the Section on CONCRETE CURING in these specifications.

508 - CONCRETE STRUCTURES

This section covers the requirements for the construction of concrete bridges, culverts, retaining walls, abutments, piers, footings, foundations and other similar concrete structures as may be shown on the Plans or stated in the Special Provisions. All work performed under this section shall meet the requirements in the Section on CONCRETE, unless specified otherwise.

508.01 - Cofferdams and Cribs

Cofferdams shall be constructed to protect fresh concrete against damage from a sudden rising of the stream and to prevent damage by erosion. No timber or bracing shall be placed inside of cofferdam or cribs that cannot be removed without damage to the concrete. The cofferdam or crib material shall be of sufficient length to allow a two (2) foot lowering of footings.

Pumping from the interior of any foundation enclosure shall be done in such a manner as to prevent any portion of the concrete materials from being carried away. No pumping will be permitted during the placing of concrete or for a period of at least twenty-four (24) hours thereafter, unless it is done from a suitable sump or well point separated from the concrete work.

The Contractor shall remove all cofferdams, cribs, sheeting, and bracing down to the elevation of the original ground line or to the new streambed elevation in case of a channel change or to the top of footings in dry holes. The removal shall be done in such a manner as not to damage any part of the new structure.

508.02 - Foundations

No concrete shall be placed until the depth of the excavation and foundation material has been approved. Earth foundation upon which concrete is placed shall be firm and free from water. Ground water shall be kept below subgrade until the concrete is set. When the subgrade is in dry earth, it shall be thoroughly dampened with water to insure that no moisture will be absorbed from the fresh concrete.

When the concrete is to be deposited on rock, the rock shall be fully uncovered, cleaned, and its surface shall be removed to a depth sufficient to expose sound rock. Bedrock shall be leveled off or cut to approximately horizontal and vertical steps. Seams in the rock shall be grouted under pressure or otherwise treated as the City Engineer may direct in writing.

508.02.1 - Foundation Seal

When required by the Plans or ordered, a concrete foundation seal shall be constructed. The foundation enclosure shall then be pumped out and the

balance of the concrete placed in the dry enclosure. Pumping to dewater a sealed cofferdam shall not commence until the seal has set sufficiently to withstand the hydrostatic pressure. When weighted cribs are employed and the weight utilized to partially overcome the hydrostatic pressure acting against the bottom of the foundation seal, special anchorage such as dowels or keys shall be provided to transfer the entire weight of the crib into the foundation seal.

508.03 - Drainage of Sub-structures

The material behind abutments, retaining walls and wing walls shall be thoroughly and effectively drained by means of granular backfill or other methods approved in writing by the City Engineer.

508.04 - Bearing and Anchorage

Bearing plates shall be set level in exact position and shall have a full and even bearing upon the concrete. The location of the anchor bolts in relation to the slotted holes in the expansion shoes shall correspond with the temperature at the time of erection. The nuts on the anchor bolts at the expansion end of the spans shall be set to permit the free movement of the span. Rocker bearings at the expansion end of spans shall be set to the proper position for the prevailing temperature.

508.05 - Construction Joints

Vertical construction joints, transverse to the centerline in concrete box girders shall be treated as follows:

The set concrete shall be thoroughly cleaned of all laitance and foreign matter and then the mating surface of the set concrete shall be thoroughly coated with a freshly mixed epoxy resin conforming to ASTM C881 Type II. The making of joints in this manner will only be permitted when the temperature of the mating materials is between sixty (60) degrees Fahrenheit and one hundred four (104) degrees Fahrenheit. The last placed section of concrete shall be placed within a period of time, after mixing the epoxy resin components, which does not exceed the epoxy resin manufacturer's recommended pot life.

508.06 - Falsework

508.06.1 - Loads

For designing falsework and centering, a weight of one hundred sixty (160) pounds per cubic foot shall be assumed for green concrete including reinforcing steel. Falsework shall be designed for full dead load and for a live load of thirty (30) pounds per square foot of horizontal surface. Falsework shall be designed and constructed so no appreciable settlement or deformation will occur and so that it provides the necessary rigidity. The City Engineer may

require the Contractor to employ screw jackets or wedges to take up settlement in the formwork either before or during placement of concrete.

508.06.2 - Cast-In-Place Concrete Bridges

The falsework shall be set to give the finished structure the camber specified or indicated on the Plans. In addition to the camber shown, allowance shall be made for settlement of the falsework using one-eighth (1/8) inch for each contact of timbers.

508.06.3 - Precast Concrete Construction

The stringers shall be built to the camber shown on the Plans. The slab forms shall be built to the camber of the stringers in place.

508.06.4 - Prestressed Concrete Construction

The stringer forms shall be set to the camber shown or noted on the Plans prior to prestressing.

508.06.5 - Removal of Falsework

Falsework for concrete structures including slabs, beams, girders, arches, and forms supporting concrete floor slabs on steel bridges, shall remain in place until tests show that the concrete has attained a compressive strength of at least seventy (70) percent of the intended strength. In the absence of such tests, the following requirements shall govern the minimum length of time the falsework shall remain in place, exclusive of days in which the temperature falls below forty (40) degrees Fahrenheit.

Span Length Feet	Numbers of Days
Less Than 10	6
10 and Less Than 20	14
20 and Less Than 30	18
30 or More	21

Falsework shall not be removed from any span of a continuous cast-in-place unit until the concrete in the entire unit meets the above-specified strength or curing period.

508.07 - Forms

508.07.1 - Metal Ties

Metal ties or anchorages within the forms shall be so constructed as to permit their removal to a depth of at least one-half (1/2) inch from the face without injury to the concrete. The use of twisted wire loop ties to hold forms in position will not be permitted, nor shall wooden spreaders be used unless authorized in writing by the City Engineer. If wire ties are permitted, wires shall be cut back to at least one-half (1/2) inch from the face of the concrete upon removal of the forms.

508.07.2 - Permanent Metal Concrete Forms

Permanent metal forms for decks shall not be used unless required or specifically permitted by the Plans and must be approved, in writing, by the City Engineer.

508.08 - Placing Concrete

Unless otherwise specified, the concrete in slab spans, "T" beams or deck girders shall be placed in one (1) continuous operation. If continuous placement of concrete girders or decks of a multi-span continuous structure is specifically permitted by the Plans, or is approved, a set-retarding admixture for the concrete may be required. Proportions are to be varied with the temperature and degree of initial retardation required to extend the plastic characteristics of the concrete. If continuous concrete placement is attempted, the concrete in any one (1) span shall be placed while the concrete in the adjacent span is still plastic. The Contractor shall submit a placing schedule for approval showing the proposed amount of admixture to be used in placing deck concrete. Materials for use as chemical set retarding admixtures shall meet the requirements of the MATERIALS section of these Specifications; however, no reduction in concrete twenty-eight (28) day strength will be allowed.

508.08.1 - Vibrating

Unless otherwise approved, the concrete shall be consolidated with suitable vibrators operating within the concrete. Vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate consolidation, especially around obstructions. Concrete shall be thoroughly consolidated in a manner that will encase the reinforcement and inserts, fill the forms, and produce a surface of uniform texture, free of rock pockets and excessive voids. Vibrators will not be required for seal concrete or concrete in shell piles.

The location, manner, and duration of the application of the vibrators shall be such as to secure maximum consolidation of the concrete without separation of the mortar and coarse aggregate and without causing water or cement paste

to flush to the surface. The number of vibrators employed shall be sufficient to consolidate the concrete within fifteen (15) minutes after it has been deposited in the forms. At least two (2) vibrators in good operating condition shall be available at the site of the structure in which more than twenty-five (25) cubic yards of concrete is to be placed. Vibrators shall transmit vibrations to the concrete at frequencies of not less than five thousand (5,000) impulses per minute. When required, deck concrete shall be vibrated with internal vibrators turning at least ten thousand eight hundred (10,800) rpm in air and shall be fully submerged. Spacing of the vibrators in the concrete mix shall be at approximately eighteen (18) to twenty-four (24) inches measured in longitudinal and transverse directions.

508.08.2 - Underwater Concrete

Concrete deposited in water shall be Seal Concrete. When conditions render it is impossible or inadvisable to dewater excavations before placing concrete, the Contractor shall deposit the concrete underwater by means of a tremie or underwater bottom dump bucket, a layer of concrete carefully placed in a compact mass in its final position which shall not be disturbed after being deposited. Water shall be maintained in a still condition at the point of deposit.

Concrete shall not be placed in running water. The forms for underwater concrete shall be constructed to provide still water within. The concrete shall be placed continuously until the required depth is reached, keeping the surface of the concrete as nearly level as possible during placing.

The tremie shall consist of a watertight tube having a diameter of not less than ten (10) inches with a hopper at the top. The tube shall be equipped with a device that will close the discharge end and prevent water from entering the tube while it is being charged with concrete. The tremie shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and to permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end shall be closed at the start of the work to prevent water entering the tube and shall be entirely sealed at all times, except when the concrete is being placed. The tremie tube shall be kept full of concrete. 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. The flow shall be continuous until the work is completed and the resulting concrete seal shall be monolithic and homogenous.

The underwater bucket shall have an open top and the bottom doors shall open freely and outwardly when tripped. The bucket shall be completely filled and slowly lowered in to avoid backwash and shall not be dumped until it rests on the surface upon which the concrete is being deposited. After discharge, the bucket shall be raised slowly until well above the concrete.

508.09 - Finishing Concrete

508.09.1 - Ordinary Surface Finish

Immediately after the forms have been removed, the Contractor shall remove form bolts and tie wires. If rock pockets are of such extent or character as to materially affect the strength of the structure or to endanger the life of the steel reinforcement, the City Engineer may declare the concrete defective and require the removal and replacement of that portion of the structure affected. Such removal and replacement shall be at the cost of the Contractor. All holes and depressions shall be cleaned, thoroughly wetted and filled with a cement mortar composed of one (1) part of cement to two (2) parts of sand. All fins caused by form joints and other projections shall be removed above the ground line. The resulting surfaces shall be reasonably smooth and uniform in texture and color. All surfaces that are not finished satisfactorily shall be "rubbed" as specified for "Rubbed Surface Finish".

508.09.2 - Rubbed Surface Finish

After the pointing has set sufficiently, the entire surface shall be thoroughly wetted and rubbed with a carborundum stone or other approved tool to the extent necessary to completely obliterate all form marks and rough spots or areas. Approved bonding agents may be used. The paste formed by the rubbing shall be spread uniformly over the surface, after which it shall be finished by floating or rubbing to attain a uniform color and texture that shall be free of any form marks, tie hole marks, etc. Plastering of such exposed concrete surfaces will not be permitted.

Concrete that has been discolored by the drip from the abrasive shall be thoroughly cleaned by using a diluted solution of muriatic acid, then washing thoroughly with clean water.

508.09.3 - Slab Finish

Deck slabs on multiple span structures and on single span structures greater than forty (40) feet in length and other wearing surfaces subject to highway traffic which are greater than forty (40) feet in length shall be finished by the machine method. All other deck slabs and wearing surfaces may be finished using either machine or hand methods.

MACHINE METHOD: A self-propelled finishing machine will be required for striking off and finishing the surface of the concrete. The Contractor shall furnish the information as to the location and method of rail support, the size of rails, and the detailed description of the finishing machine.

Prior to beginning concreting operations, the finishing machine shall be operated over the full length of the bridge segment to be finished. This test run shall be made with the screed adjusted to its finishing position. While operating the finishing machine in this test, the screed rails shall be checked for deflection and proper adjustment, the cover on slab reinforcement, and the forms checked. All necessary corrections shall be made before concreting is begun. After the concrete has been placed and the finishing machine has made the first pass over the concrete, the rail grades may be readjusted in relation to the final grade. The concrete shall then be given additional passes of the screed as required to obtain a smooth, even surface of the required contour, maintaining a uniform small amount of mortar ahead of the screed on the final pass. At no time shall the amount of concrete carried forward ahead of the screed be sufficient to cause slipping of the finishing machine wheels on the rails.

HAND METHOD: After the concrete is placed, it shall be struck off with a template or a vibrating screed. Concrete shall be finished to an even surface by means of both longitudinal and transverse floats. The use of a power trowel will not be permitted.

After finishing by either the machine or hand method, the concrete surface shall be straight edged. While the concrete is still plastic, the Contractor shall test the surface of the concrete for trueness. For this purpose, the Contractor shall furnish and use an approved ten (10) foot straightedge. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the whole area gone over from one side of the slab to the other as necessary. Advancement along the surface shall be in successive stages of not more than one-half (1/2) the length of the straightedge.

Any depressions found shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meets the requirements for smoothness. Straight edging and surface correction shall be done from footbridges resting on the side forms and spanning, but not touching, the concrete. Straightedge testing and surface corrections shall continue until the entire surface is found to be free from observable departures from the straightedge and the slab conforms to the required grade and cross section.

When the concrete has hardened sufficiently, the surface shall be given a broom finish. The broom shall be of a type approved by the City Engineer. The desired average texture depth shall be as approved by the City Engineer. The stroke shall be parallel to the joints or ends of the bridge or perpendicular to the centerline, as directed, with adjacent strokes slightly overlapped. The finished

surface shall be free from porous spots, irregularities, depressions, small pockets, or rough spots.

For structures that will receive a deck membrane and asphalt overlay, the concrete shall be given a screed or float finish. The surface as finished shall be free from porous spots, irregularities, depressions, small pockets, or rough spots.

At the end of the curing period, the slab surface will be tested for smoothness in accordance with the Idaho Department of Transportation, Division of Highways Test Method T-87. The surface shall not vary in no place more than one-quarter (1/4) inch in ten (10) feet from the lower edge of the straightedge and ninety (90) percent of the readings shall not exceed one-eighth (1/8) inch in ten (10) feet.

508.10 - Curing

All prestressed structural concrete such as prestressed girders and beams shall be cured using the STEAM CURE Method in these Specifications. Other structures shall be cured as specified in the requirements of the Section on CONCRETE CURING in these Specifications or approved in writing by the City Engineer.

509 - MEASUREMENT AND PAYMENT

Unless otherwise called for elsewhere, or on the Plans, or in the Special Provisions, there shall be no separate measurement and payment for items covered in the Section on MATERIALS of these Specifications. All required materials, equipment, labor and transportation necessary to complete the acceptable final product, requiring the use of one (1) or any combination of one (1) or more of the materials mentioned in the Section on MATERIALS shall be considered as incidental and shall be included in the unit price bid for the particular type of concrete used.

509.01 - Miscellaneous Concrete

509.01.1 - Measurement

Miscellaneous Concrete shall be measured on a CUBIC YARD basis with the measurement being determined by the dimensions or quantity shown on the Plans or by ordered batch ticket, except that the volume of concrete placed under water and other such concrete may be based on batch design volumes. No deduction will be made for the volume occupied by the reinforcing steel, anchors, conduit, weep holes, H-piling, or chamfers. The volume of concrete displaced by pipes, culverts or piles other than H-piling will be deducted. The City Engineer may require measurement by a three (3) dimensional volumetric method of the concrete in place with appropriate deductions for shrinkage.

509.01.2 - Payment

The various classes of concrete for Miscellaneous Concrete shall be paid at the Contract unit price bid on a CUBIC YARD basis. The payment shall be considered as full compensation for all materials, labor, equipment, and incidentals required to construct, finish, cure and protect the concrete. Any work that is essential to the construction, but for which no bid item is included in the Contract shall be considered as incidental work and all costs thereof shall be included in the various unit price bid for other items.

509.02 - Curbs and Gutters

509.02.1 - Measurement

Curbs shall be measured on a LINEAR FOOT basis with the measurement being made along the centerline of the top of the Curb from the beginning to the end of the constructed curb including all corner radii. When two curbs intersect, the measurement shall be from the intersection of the centerlines. Curb poured in conjunction with gutter such as combination curb and gutter or two piece curb and gutter shall not be measured separately.

Gutters and Combination Curb and Gutters shall be measured on a LINEAR FOOT basis with the measurement being made along the flow line of the Gutter from the beginning to the end of the constructed Gutter including all corner radii. When two gutters intersect, the measurement shall be from the intersection of the flow lines. No deductions will be made for inlet boxes installed in the Gutter.

509.02.2 - Payment for Combination Curb and Gutter

The two (2) types of Combination Curb and Gutter shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be considered as full compensation for all materials, labor, equipment and incidentals required to construct, finish, cure and protect the concrete. Any work that is essential to the construction, but for which no bid item is included in the Contract shall be considered as incidental work and all costs thereof shall be included in the various unit price bid for other items.

509.02.3 - Payment for Alley Gutter

The two (2) types of Alley Gutter shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be considered as full compensation for all materials, labor, equipment and incidentals required to construct, finish, cure and protect the concrete. Any work that is essential to the construction, but for which no bid item is included in the Contract shall be considered as incidental work and all costs thereof shall be included in the various unit price bid for other items.

509.02.4 - Payment for Valley Gutter

Valley Gutter shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be considered as full compensation for all materials, labor, equipment and incidentals required to construct, finish, cure and protect the concrete. Any work that is essential to the construction, but for which no bid item is included in the Contract shall be considered as incidental work and all costs thereof shall be included in the various unit price bid for other items.

509.02.5 - Payment for Curb

Curb shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be considered as full compensation for all materials, labor, equipment and incidentals required to construct, finish, cure and protect the concrete. Any work that is essential to the construction, but for which no bid item is included in the Contract shall be considered as incidental work and all costs thereof shall be included in the various unit price bid for other items.

509.03 - Flatwork

509.03.1 - Measurement

The two (2) thicknesses of Flatwork that includes sidewalk, approaches Combination Curb and Sidewalk and other similar concrete Flatwork shall be measured on a SQUARE YARD basis.

509.03.2 - Payment

The two (2) thicknesses of Flatwork and Combination Curb and Sidewalk shall be paid at the Contract unit price bid on a SQUARE YARD basis. The payment shall be considered as full compensation for all materials, labor, equipment and incidentals required to construct, finish, cure and protect the concrete improvements in accordance with the Plans, Special Provisions and these Specifications. Any work that is essential to the construction, but for which no bid item is included in the Contract shall be considered as incidental work and all costs thereof shall be included in the various unit price bid for other items.

509.04 - Structures

509.04.1 – Measurement for Structures

Precast Structures shall be measured by the LUMP SUM complete and in place.

Concrete Parapet shall be measured by the LINEAR FOOT basis, complete and in place.

Structural Concrete shall be measured by the CUBIC YARD basis, complete and in place.

509.04.2 – Payment for Precast Structure

Precast Structure shall be at the Contract unit price bid on a LUMP SUM basis. The payment shall be considered as full compensation for all materials, labor, haul, equipment and incidentals required to construct, finish, cure and protect the concrete. Any work that is essential to the construction, but for which no bid item is included in the Contract shall be considered as incidental work and all costs thereof shall be included in the various unit price bid for other items. The payment shall also include reinforcing steel, welding, non-shrink grouting and any other work associated with a complete fabrication/installation of Precast Structure in whole or in part.

509.04.3 - Payment for Concrete Parapet

Concrete Parapet shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be considered as full compensation for all

materials, labor, equipment and incidentals required to construct, finish, cure and protect the concrete. Any work that is essential to the construction, but for which no bid item is included in the Contract shall be considered as incidental work and all costs thereof shall be included in the various unit price bid for other items. The payment shall also include reinforcing steel, which is cast within the parapets in whole or in part.

509.04.4 - Payment for Structural Concrete

Structural Concrete such as deck concrete, approach slabs, pier walls, headwalls and etc. shall be paid at the Contract unit price bid on a CUBIC YARD basis. The payment shall be considered as full compensation for all materials, labor, equipment and incidentals required to construct, finish, cure and protect the concrete. Any work that is essential to the construction, but for which no bid item is included in the Contract shall be considered as incidental work and all costs thereof shall be included in the various unit price bid for other items. The payment shall also include reinforcing steel, joint sealers, sleeper beams and curbs as shown on the Plans.

509.05 - Metal Reinforcement

509.05.1 - Measurement

There shall be no separate measurement of Metal Reinforcement unless it is indicated in the Specifications, the Contract, or in the Plans. When called for, Metal Reinforcement will be measured by the POUND based on the theoretical number of pounds complete-in-place as shown on the Plans or placed as ordered.

509.05.2 - Payment

Unless there is an item called for in the Specifications, the Contract or shown on the Plans, no separate payment will be made for Metal Reinforcement and all costs of furnishing and placing of the Metal Reinforcement shall be considered as incidental and the cost thereof shall be included in other items related thereto.

When called for in the Contract, the accepted quantity of this item shall be paid for at the Contract unit price bid per POUND for Metal Reinforcement complete-in-place. No allowance will be made for clips, wire or other material used for fastening reinforcement in place. The weight of splice bars shall not be included in the quantity for which payment is made, but the cost thereof shall be included in the Contract unit price bid for Metal Reinforcement.

**CITY OF IDAHO FALLS
PUBLIC WORKS DIVISION
ENGINEERING DEPARTMENT**

**STANDARD SPECIFICATIONS FOR
WATER LINES
SECTION 600**

2010 EDITION

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WATER LINES

SECTION 600

600 - INTRODUCTION

These Specifications cover the pipe and fittings normally used for water distribution systems. All materials, workmanship and installation of the Water Distribution System shall be done in accordance with these Standard Specifications, the Plans and Special Provisions or as directed by the City Engineer. Any installation not conforming to the requirements shall be removed and replaced or repaired to the satisfaction of the City Engineer at the expense of the Contractor responsible for the work. No work will be considered for acceptance until such repair or replacement is accomplished.

All water lines with a diameter of two (2) inches or smaller between the main line and the meter pit/curb stop valve shall be defined for the purpose of these specifications as "SERVICE LINES". All water lines with a diameter of two (2) inches or smaller between the meter pit/curb stop valve and the building shall be defined for the purpose of these specifications as "CUSTOMER LINES" and shall meet the requirements of the currently adopted City of Idaho Falls plumbing code. All other water lines including, but not limited to, main lines, fire lines, private main lines, customer lines and service lines larger than two (2) inches shall be defined for the purpose of these specifications as "MAIN LINES".

Specification references made herein for manufactured materials such as pipe, hydrants, valves, and fittings refer to designations of the American Water Works Association (AWWA) as referenced in the latest edition on the date of plan approval. It is not intended that materials listed herein are to be considered equal or generally interchangeable for all applications. The City Engineer shall determine which materials are suitable for the project and shall specify those materials in the Plans and/or Special Provisions.

Water lines that cross existing non-potable water lines shall be installed in accordance with the appropriate section of IDAPA 58, Title 01, Chapter 08 of the Idaho Rules for Public Drinking Water Systems that is currently in effect at the time of plan approval.

The Contractor shall immediately submit written notice to the City Engineer of changes in Site Conditions, such as additional trench depth and/or width, bedding conditions and combinations thereof that may require a higher class or type of pipe than that specified. Additional compensation shall not be awarded for any extra work resulting from such changed conditions unless prior to performing such extra work the Contractor shall have submitted written notice

of the changed conditions to the City Engineer and the City Engineer shall have given written authorization of the extra work. If such changed conditions are for the convenience of the Contractor's operations, any and all additional costs associated therewith shall be at the expense of the Contractor.

To ensure the integrity of the Water Distribution System, all water lines connected to or intended to be connected to the system shall be constructed in accordance with these Specifications. However, the Specifications for Excavation and Backfill, Portland Cement Concrete Construction and any other work performed on private property shall apply only to the actual PIPE ZONE, as defined in the Specifications for Trench Excavation and Backfill, of the constructed water line. This requirement shall not imply any responsibility on the part of the City for the construction or maintenance of any privately owned water line or system.

To ensure electrical continuity throughout the Water Distribution System, any work on any underground water line connected to the system should be performed in a manner that will maintain or improve the continuity of the water line.

601 - MATERIALS

All materials shall be in accordance with the standards as set forth below and all normal structures shall comply with the Standard Drawings. A complete list of approved water line materials is available at the City Water Department. Call telephone number (208) 612-8471 for a copy of the current list or to resolve any water line material questions.

601.01 - Ductile Iron Pipe

Ductile iron pipe shall be of Class 50 or higher as may be required by the bedding, pressure and loading conditions encountered at the project site. It shall be in accordance with AWWA C-151 "Ductile Iron with Cement Lining". Cement lining shall be in accordance with AWWA C-104. Joints shall be either mechanical or push on joints, in accordance with AWWA C-111.

601.02 - Fittings

601.02.1 - Pipe Fittings

All ductile iron pipe fittings shall be both NSF 61 and ISO 9001 certified and shall conform to the latest specifications of AWWA C-110 for full body. All ductile iron short body fittings shall conform to the latest specifications of AWWA C-153 for compact type. Lining, type of joints (mechanical or push-on) and other special items shall be compatible with the type of pipe used.

601.02.2 - Tapping Sleeves

All tapping sleeves shall be NSF 61 certified. Tapping sleeves shall be used on all taps, larger than two (2) inches in size, made to existing water mains. Approved types of tapping sleeves include Romac SST and Ford Fast Tap.

601.03 - Valves

All valves shall be NSF 61 certified. Valves shall be suitable for ordinary water works service intended to be installed in a normal position on buried pipelines for water distribution systems. The valve shall be the standard pattern of a manufacturer whose products are approved by the City and shall have the name or mark of the manufacturer, year the valve casting was made, size and working pressure of not less than one hundred fifty (150) pounds per square inch, plainly cast in raised letters on the valve body or bonnet. Valves shall have mechanical joint connections.

Valves shall be opened by turning the operating nut counter-clockwise and the operating nut shall have an arrow cast in the middle indicating the direction of opening. All valve operating stems shall be equipped with a two (2) inch operating nut. When a valve is installed at a depth greater than six (6) feet, an

extension stem shall be installed. The top of the stem shall be within eighteen (18) inches of the finished or proposed surface of the roadway. Prior to shipment from the factory, each valve shall be tested by hydrostatic pressure equal to at least twice the specified water working pressure. Prior to shipment to the job site, three (3) certified copies of performance tests complying with the AWWA Specification for the type of valve supplied, shall be submitted to the City Engineer.

601.03.1 - Gate Valves

All gate valves shall be “resilient seat/wedge” valves. The maximum size for gate valves shall be ten (10) inches. The minimum requirement for all “resilient seat/wedge gate valves” shall conform to AWWA C-509. The minimum requirement for all reduced wall “resilient seat/wedge” gate valves shall conform to AWWA C-515. All materials used in the manufacture of water works gate valves shall conform to the AWWA Standards designed for each material listed.

601.03.2 - Butterfly Valves

All butterfly valves shall be “rubber seated” valves. The minimum size for butterfly valves shall be twelve (12) inches. The minimum requirements for all butterfly valves shall conform to AWWA C-504.

601.03.3 - Tapping Valves

All tapping valves shall be “resilient seat” valves. The maximum size for tapping valves shall be twelve (12) inches. The minimum requirement for all “resilient seat” tapping valves shall conform to AWWA C-509. The minimum requirement for all reduced wall “resilient seat” tapping valves shall conform to AWWA C-515.

601.04 - Valve Boxes

Castings for cast iron parts of valve boxes shall conform to ASTM A-48 and have the word “WATER” cast in the lid. Valve boxes shall be of heavy duty cast iron complete with cover and shall be of the two (2) or three (3) piece extension type with slip adjustment and flared base. The boxes shall be of such length as to be adapted without full extension to the depth of cover required over the pipe at the valve location.

601.05 - Fire Hydrants

601.05.1 - Fire Hydrants

Fire hydrants shall be of compression type. The name or mark of the manufacturer, size of the valve opening, and the year of manufacture shall be plainly cast in raised letters and so placed on the fire hydrant barrel as to be visible after the fire hydrant has been installed. As a minimum requirement, fire

hydrants shall be of a dry barrel type and shall be designed for working pressures of one hundred fifty (150) pounds per square inch and shall conform to AWWA C-502. All fire hydrants shall breakaway at ground level on impact and shall be designed to prevent water leakage when damaged.

The fire hydrant body shall be of ductile or cast iron, fully mounted with approved non-corrodible metals. All wearing surfaces shall be either bronze or some other non-corrodible material and there shall be no moving bearing or contact surfaces of iron in contact with iron or steel. All contact surfaces shall be finished or machined in the best workmanlike manner and all wearing surfaces shall be easily renewable.

Fire hydrants shall be served by a minimum main line size of six (6) inches. Fire hydrants shall have a minimum of five (5) inch main valve opening with mechanical joint ends. Fire hydrants shall have a four and one-half (4-1/2) inch steamer nozzle national standard hose coupling threads (threads to be national standard form) and two (2), two and one-half (2-1/2) inch national standard thread hose nozzles all conforming to ASA specifications B-26. All fire hydrants shall withstand hydrostatic tests of twice the design working pressures. Fire hydrants shall open by turning counter clockwise; operating nut shall be national standard one and one-half (1-1/2) inch pentagon measured from point to opposite flat. A drain valve shall provide for rapid drainage of the fire hydrant after use and shall close securely when the fire hydrant is open. Each fire hydrant shall have its own specific water line valve, which is to be located a maximum of five (5) feet from the centerline of the main water supply line.

All nozzles shall be fitted with cast iron threaded caps with operating nut of same design and proportions as the fire hydrants stem nut. The cap shall be threaded to fit the corresponding nozzle and shall be fitted with suitable neoprene gaskets for positive watertightness under test pressures.

Joint restraints for harnessing the fire hydrant to the connecting pipe from the main in the street shall be used if the fire hydrant is to be placed in service before placement of thrust blocks and backfilling is completed.

All iron parts of the fire hydrant, both inside and outside, shall be thoroughly cleaned and painted. All inside surfaces and outside surfaces below the sidewalk ring shall be coated with asphalt varnish, Federal Specifications TT-P-51a or JANP-450. They shall be covered with two (2) coats, the first having dried thoroughly before the second is applied.

The outside of the fire hydrant above the sidewalk ring shall be thoroughly cleaned and thereafter painted with one (1) coat of paint of durable composition conforming to Federal Specification TT-P-86a, Type IV and two (2) additional coats of Chrome Yellow, OSHA Safety Yellow, or approved equal, on the body and cap.

601.05.2 - Flush Hydrants

Flush hydrants shall contain a two (2) inch FIP inlet and two (2) inch NPT nozzle outlet. Minimum burial depth for flush hydrants shall be 6 feet, with a nozzle setting between six (6) inches and twelve (12) inches below finished grade. Flush hydrants shall be self-draining and non-freezing. Flush hydrants shall be operated by turning a top-mounted 9/16 inch square nut counterclockwise to open and clockwise to close. Drain outlet must be sealed in all positions from ¼ open to fully open. All internal working parts, the inlet and the outlet shall be low-lead brass. All working parts shall be serviceable from above with no digging required. All wear parts (o-rings and valve seat) shall be of commonly available dimensions and materials and none may be of vendor-unique design. Flush hydrants shall be for below grade applications, designed to fit within a standard valve box.

601.06 - Service Lines

All service lines shall be type “K” soft copper tubing and installed using the following or equal. All service lines shall be installed using valves, fittings and appurtenances approved by the Water Department. All service lines shall be installed to ensure electrical continuity for the full length of the service line from the main line to the curb stop valve. Service saddles shall be used on taps larger than one (1) inch. Service saddles shall be double-strapped and shall contain a FIP threaded outlet. The use of couplings for service lines shall be restricted from being used, unless the length of service line is such that one (1) complete roll or stick of type “K” soft copper tubing will not make the connection from corporation stop to curb stop valve.

601.06.1 - Corporation Stops

All corporation stops shall be ball type and have an iron pipe inlet thread and conductive compression outlet for type “K” soft copper tubing.

NOTE: Teflon tape required for threaded connections.

601.06.2 - Service Line Tubing

Type “K” soft copper tubing to conform to AWWA C-800, Section 2.

601.06.3 - Curb Stops

All curb stops shall be ball type and have a conductive compression inlet for type “K” soft copper tubing and shall be a one-quarter (1/4) turn with stop.

601.06.4 - Curb Boxes

Curb boxes shall be provided with a shut off rod of such length that the top of said rod shall be between six to thirty-six (6 - 36) inches below proposed finish grade. Boxes shall have an arch pattern base and a two hole Eire style lid.

601.06.5 - Curb Box Sleeves

Mueller H-10342 or equal for use in sidewalks.

601.06.6 - Three Part Unions (Couplers)

Three part unions shall be conductive compression for all sizes.

601.07 - Special Pipe Zone Material

Special Pipe Zone Material for bedding and/or backfill shall be a granular material consisting of crushed aggregate having a maximum size of three-quarters (3/4) inch, uniformly graded from course to fine meeting the requirements of Aggregate Base in the Standard Specifications.

601.08 - Water Main Access Structure

601.08.1 - Water Main Access Structure

All materials shall meet the requirements of the City of Idaho Standard Specifications.

Manhole sections shall meet the requirements of subsection 701.05 of the City of Idaho Falls Standard Specifications.

All concrete shall consist of Class 4 or 4F.

The one (1) inch service connection and installation of the butterfly or gate valve shall be considered incidental to this item. Steel casing shall be required a minimum of three (3) horizontal feet beyond the high water mark on both sides of the water crossing. Casing wall thickness shall be as designated in the 400 Section of these Standard Specifications. Minimum depth of cover beneath the channel bottom of the water crossing shall be three (3) feet. Refer to Standard Drawing, Sheet Number 600-7 for additional information.

604 - TESTING

Pipe shall be subjected to a hydrostatic test after it is laid. Each section of pipe between valves shall be tested as soon as possible after laying or when directed by the City Engineer. Field tests shall be made before backfilling over any joints or fittings at points where pressure reactions and movement may occur, such as bends, tees and plugs. The pipe shall be properly blocked or braced. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking and remove it after testing at no additional cost.

The Contractor shall furnish, at his expense, all labor and equipment necessary to conduct the test. When water is available for testing, it will be furnished without charge. Where water is not available from the City, the Contractor shall provide water from an approved source for testing and the cost thereof shall be borne by the Contractor.

604.01 - Hydrostatic Testing

Hydrostatic tests shall be performed on every complete section of the water line between two (2) valves and each valve shall withstand the same test pressure as the pipe with no pressure active in the section of pipe beyond the closed valves.

The test pressures to which ductile iron pipe water lines and appurtenances shall be tested hydrostatically in accordance with the current AWWA Standards Test pressures shall not be above the rated pressure of valves or fire hydrants.

Before applying this specified test pressure, all air shall be expelled from the pipe. If hydrants are not available at high places, the Contractor shall make taps for this purpose and insert the plugs after the tests have been completed at no extra cost to the City.

Defective materials or workmanship discovered as a result of the hydrostatic field test shall be replaced by the Contractor at the Contractor's expense. Whenever it is necessary to replace defective material or correct the workmanship, the hydrostatic test shall be performed again at the Contractor's expense until a satisfactory test is obtained.

604.01.1 - Hydrostatic Test Pressures at Factory for Valves

Each valve shall be tested at the factory for performance and operation prior to painting. These tests will be conducted in accordance with the AWWA Specification for the type of valve supplied. Tests for special valves shall be completed as described in the Special Provisions.

604.01.2 - Factory Hydrostatic Testing of Fire Hydrants

Before the hydrant is painted at the factory, it shall be subjected to an internal hydrostatic test of three hundred (300) pounds per square inch with the hydrant valve in a closed position and again with the hydrant valve in an open position.

When requested by the City Engineer, three (3) certified copies of performance tests complying with the AWWA Specification for the type of hydrant being supplied, shall be submitted prior to its installation.

605 - CONSTRUCTION

This section covers the installation of the water line pipe, valves, tees, fire hydrants and related appurtenances. The construction of these lines and facilities shall be in accordance with the manufacturer's specifications and instructions for installation, these Specifications or as directed by the City Engineer. The Contractor shall provide all tools and equipment, including any special tools designed for installing each particular type of pipe used.

The type and gradation of the material used in bedding, haunching and initial backfilling as well as the manner and care with which it is installed are important factors in achieving satisfactory installation of the pipe.

The City Engineer or Surveyor will provide survey line and grade control hubs in a manner consistent with accepted practices. The Contractor shall give the City Engineer forty-eight (48) hours notice of the time and place he will require the laying out and staking of any portion of the work. The Contractor shall carefully preserve all stakes, marks, etc. In case of his carelessness, unnecessary destruction or the removal by him or his employees of such stakes, marks, etc.; the same shall be replaced by the City Engineer at the Contractor's expense. The Contractor shall be responsible for adequately and correctly transferring the lines and grades established by the City Engineer to the structure or other facility being constructed or installed.

The Contractor shall consistently check the line and grade of the facilities being constructed and in the event there is a discrepancy, the work shall be immediately stopped, the City Engineer notified in writing and the cause remedied before proceeding with the work.

605.01 - Temporary Water Service

When replacement construction is required of an existing water main line pipe, a temporary water service shall be required. This temporary water service is required during the time it takes for the proper construction of the replacement water main line pipe, including the required time for disinfection, pressure testing, flushing, bacterial testing and receiving results of an acceptable bacterial test.

The Contractor shall utilize such material for temporary water service that is capable of supplying the volume of water that is currently being required by the adjacent properties, except that volume required for fire protection. This material shall be "new" or used previously only for potable water.

This temporary water service shall be handled in such a manner as to maintain a safe clean temporary water service at all times during the replacement construction. The temporary water service and hydrant shall be chlorinated and have a passing bacteria test prior to being placed in service. The Contractor is free to choose his own method and material for temporary water service;

provided, however, that the method shall be demonstrated to be feasible and work properly prior to starting the replacement construction and shall be acceptable to the City Engineer. Close coordination with the City's Water Department will be required to minimize adverse impact on water service operations and surrounding private property.

The Contractor will be required to shut off the existing water line that is to be replaced prior to any excavation. This may be done on a block-by-block basis if the Contractor so desires. The Contractor shall notify all property owners and the City Water Department of any water line that is to be turned off during the replacement construction. The Contractor shall provide an approximate time and duration for each water main line shut-off period. Any property that requires water service during a shut-off period shall have a temporary water service connected to it.

The Contractor may "hose over", with a hose consisting of drinking water quality materials from one property with water service to another property without service, provided both property owners understand and agree to the arrangement and the temporary line can be maintained on a twenty-four (24) hour basis. The Contractor shall not "hose over" from a property that is already "hosed over". The Contractor shall repair any faucets, etc. which become plugged during the temporary service.

If overland pipelines or hoses are used for the temporary water service, they shall be located and placed in a manner to minimize interference with pedestrian and vehicular traffic. Appropriate signing and barricading, in accordance with MUTCD, shall be incorporated to mark street crossings and sidewalk areas.

Upon completion of the "new" replaced water main line and reconnection of the existing or new service lines, the Contractor shall flush each property's water system and ensure that all faucets, etc. are not plugged.

The Contractor shall be entirely responsible for the methods and results of the temporary water service. The Contractor shall indemnify and hold harmless the City from any and all damages or claims arising from the temporary water service operations.

605.02 - Excavation and Backfill

All water lines shall be installed at a minimum depth of six (6) feet and a maximum depth of eight (8) feet of cover from the finished or proposed grade or as directed by the City Engineer. All excavation and backfill shall be performed in accordance with the Specifications for Trench Excavation and Backfill, unless otherwise noted in these Specifications or as directed by the City Engineer.

605.02.1 - Dewatering

Where water is encountered in the trench, it shall be removed at the Contractor's expense during pipe laying operations and the trench so maintained until the ends of the pipe are sealed and provisions are made to prevent the floating of the pipe. Trench water shall not be allowed to enter the pipe at any time.

605.02.2 - Bedding and Backfill for Copper Pipe

The Contractor shall furnish SPECIAL PIPE ZONE MATERIAL for placement in the PIPE ZONE for all copper pipe. Bedding and backfill for copper pipe shall be in accordance with the Section on Backfill for Plastic or Copper Pipe in the Specifications for Trench Excavation and Backfill.

605.03 - Pipe

All pipe and fittings shall be inspected for defects. All pipe, fittings, valves and hydrants shall be carefully lowered into the trench, piece by piece, by means of a derrick, ropes or other suitable tools or equipment in such a manner as to prevent damage to the water line materials and protective coatings and linings. Under no circumstances shall water line materials be dropped or dumped into the trench or onto the ground.

Dirt and other foreign material shall be prevented from entering the pipe or pipe jointing during the handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned and relayed. At times when pipe installation is not in progress, the open end of the pipe shall be closed by a watertight plug or by other means approved in writing by the City Engineer, to prevent dirt or foreign material from entering the pipe. Pipe shall be laid with bell ends facing in the direction of laying or as directed by the City Engineer.

The cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe. All pipe shall be cut in accordance with the manufacturer's recommended practices by qualified, experienced workmen. Field cut pipe lengths shall be filed or ground to resemble the spigot end of the manufactured pipe.

All openings in the pipe or fittings shall be sealed with an approved plug and thrust block.

605.03.1 - Line and Grade

All pipe shall be laid to conform to the prescribed line and grade as shown on the Plans and as staked by the City Engineer. Any significant variance greater

than zero-point-five (0.5) feet from the established line and grade shall be approved by the City Engineer.

605.03.2 - Curves

Long radius curves, either horizontal or vertical may be laid with standard pipe by deflections at the joints. If the pipeline is shown curved on the Plans and no special fittings are shown, then the Contractor can assume that the curves can be made by deflection of the joints with standard lengths of pipe. If shorter lengths are required, the Plan will INDICATE MAXIMUM LENGTHS TO BE USED.

Where field conditions require deflection or curves not anticipated by the Plans, the City Engineer will determine the methods to be used. No additional payment will be made for laying pipe on curves as shown on the Plans, or for field changes involving standard lengths of pipe deflected at the joints. Where special fittings not shown on the Plans are required to meet field conditions, additional payment will be made for the special fittings as provided in the General Conditions for Changes and Extra Work and Changed Conditions.

Maximum deflections at pipe joints and laying radius for the various pipe lengths shall conform to AWWA C-600 in the appropriate section for the pipe in use. When rubber gasketed pipe is laid on a curve, the pipe shall be jointed in a straight alignment and then deflected to the curved alignment. Trenches shall be made wider on curves for this purpose.

605.03.3 - Pumice for Insulation

Pumice for insulation shall be used with written permission of the City Engineer when the depth from the top of pipe to finish grade is between four and one-half (4-1/2) feet and six (6) feet due to rock encountered in the trench. Top of pipe depths less than four and one-half (4-1/2) feet shall require rock excavation.

The Contractor shall furnish and install the required filter fabric and four (4) inch minimum thickness rigid board closed-cell polystyrofoam insulation and pumice in accordance with these Specifications, Standard Drawings and in close conformity with the lines and grades shown on the Plans or as directed by the City Engineer.

605.04 - Joints

Joints for pipe shall be of the mechanical or push on type, unless otherwise provided in the Special Provisions. The outside diameter of the spigot end of bell and spigot pipe varies with the types, size and class of pipe. There is only one (1) joint size for each diameter of mechanical joint pipe. Thus, difficulty may be met when attempts are made to connect various types of existing bell or

spigot pipe or mechanical joint pipe to other types of pipe. When such connections must be made, a manufactured transition coupling shall be used.

605.04.1 - Mechanical Joints

The last eight (8) inches outside of the spigot and inside of the bell of mechanical joint pipe and/or fittings shall be thoroughly cleaned to remove oil, grit, tar (other than standard coating) and other foreign matter from the joint and then coated with an approved lubricant. The cast iron gland shall then be slipped onto the spigot end of the pipe with a lip extension of the gland toward the socket or bell end. The rubber gasket shall be coated with an approved lubricant and placed on the spigot end with the thick edge toward the gland.

The entire section of the pipe shall be pushed forward to seat the spigot end into the bell. The gasket shall then be pressed into place within the bell, being careful to have the gasket evenly located around the entire joint. The cast iron gland shall then be moved along the pipe into position for bolting with all of the nuts inserted and the nuts finger tightened. All nuts shall then be tightened with a torque wrench. The torque for the three-quarter (3/4) inch size bolts shall be sixty (60) to ninety (90) foot-pounds.

Nuts spaced one hundred eighty (180) degrees apart shall be tightened alternately in order to produce an equal pressure on all parts of the gland.

605.04.2 - Rubber Gasketed Joints

The inside of the bell shall be thoroughly cleaned to remove oil, grit, tar (other than standard coating) and other foreign matter from the joint. The circular rubber gaskets shall be flexed inward and inserted into the gasket seat. A thin film of gasket lubricant shall be applied to the inside surface of the gasket. Gasket lubricant shall be a solution of vegetable soap or the solution supplied by the pipe manufacturer and approved by the City Engineer. The spigot end of the pipe shall be cleaned, lubricated and entered into the rubber gasket in the bell, using care to keep the joint from contacting the ground. The joint shall then be completed by forcing the spigot end into the bell using a fork tool or jack type tool or other device approved by the City Engineer.

Pipe that is not furnished with a depth mark shall be marked according to manufacturer's recommendations before assembly to ensure that the spigot end is inserted to the full depth of the joint. Field cut pipe lengths shall be filed or ground to resemble the spigot end of the manufactured pipe.

605.04.3 - Conductivity

A continuity connection shall be provided at all mechanical and rubber gasketed joints. The conductor shall be number two (2) or larger stranded copper wire with end sleeves. Such electrical connections shall be done using Cadweld Type HB or equal. The surface of the pipe must be exposed by removing factory

coatings where Cadweld connections are made to the pipe. After connections have been completed, all exposed surfaces of the pipe, where the coatings were removed to complete the connection, shall be thoroughly cleaned to expose the iron base metal. The connection and cleaned area of the pipe shall then be coated with two (2) or more field coats of bitumastic coating.

605.05 - Connections to Existing Mains

The Contractor will be required to connect the new main to all existing mains. The Contractor shall furnish all crosses, tees and other miscellaneous fittings or materials required to make these connections, unless otherwise provided for in the Special Provisions.

All lateral connections to existing mains shall be done under pressure unless "special permission" to interrupt service is granted by the Water Superintendent or his agent. Where "special permission" is required, the Water Superintendent, the City Engineer, and the Contractor shall mutually agree upon a date for the shut-off and connection which will allow ample time to assemble all needed labor and materials. The Contractor shall notify all affected customers and the Water Department of the starting time and duration of the water shut off period.

605.06 - Service Lines and Connections

The Contractor will make all taps for service connections and install the service line pipe, unless otherwise provided in the Plans or Special Provisions. Teflon tape shall be used on the threads of all corporation stops.

Before installing type "K" copper pipe into fittings, the Contractor shall ream the copper tubing to remove burrs or protrusions and then mechanically round the ends of the type "K" copper pipe using a pipe swaging tool or Mueller H-18000 or similar flaring tool. This shall insure the pipe roundness of the type "K" copper pipe before installation.

The Contractor shall leave the main trench open at all points where service connections are to be made until such services are installed and tested to the curb stop valve. All shut off rods shall extend from the curb stop valve to between six (6) inches and three (3) feet of the finished grade. All connections shall be done in such a manner to insure electrical conductivity.

The Contractor shall plan and coordinate his work with that of the water utility and the property owner, so that water service can be resumed with the least possible inconvenience to the public, but in no event shall water service be disconnected to any customer for a period of more than six (6) continuative hours, without the written permission of the City Engineer.

All service lines shall be flushed prior to connecting to the customer line. New service lines (not connected to an existing customer line) shall be installed from the main line to a minimum of ten (10) feet beyond the right-of-way line. All service lines not connected to an existing customer line shall be plugged by mechanical means that will maintain water tightness under pressure. Damages occurring through faulty installations shall be the responsibility of the Contractor.

605.06.1 - Reconnecting Service Lines

When "Reconnect Service Line" is specified, the existing service line is to be disconnected from the old main line and reconnected to the new main line. Service line reconnections shall meet all the requirements set forth herein for service lines.

605.06.2 - Excavation and Backfill for Service Lines

Excavation and backfill of service line trenches for water service connections shall be considered to be the same as that specified for main line trenches. When copper pipe is used, the Contractor shall furnish and place SPECIAL PIPE ZONE MATERIAL for bedding and backfill in the PIPE ZONE. Such material shall be installed according to the Section on Backfill for Plastic or Copper Pipe in the Specifications for Trench Excavation and Backfill.

If service line is to be plugged for future use a two by four (2 x 4) inch wood post shall be placed at this plug and the post should extend approximately three (3) feet above the existing ground line.

605.06.3 - Meter Pit

Meter pits are required on all newly installed service lines. Meter pits shall meet the requirements as shown in the Standard Drawings.

605.07 - Thrust Blocking

Concrete thrust blocking shall be placed at bends, hydrants, tees, tapping tees and crosses and other places as may be directed by the City Engineer. Thrust blocking shall consist of an adequate amount of Portland Cement Concrete poured in place as detailed on the Plans or in the Standard Drawings and meeting the requirements of the Section in the Specifications for Portland Cement Concrete. All Portland Cement Concrete used for concrete thrust blocking shall be Class 4. Polyethylene wrap with a minimum thickness of four (4) mil, shall be installed between the water line appurtenances and concrete for bond break.

The amount of surface area contact between the compression surface of the concrete thrust block and the adjacent undisturbed earth shall be at least that

shown on the Standard Drawings for all sizes of appurtenances. Concrete blocking, when placed as indicated on the Standard Drawings shall be bearing against solid, undisturbed earth at the sides and bottom of the trench excavation and shall be shaped so as not to obstruct access to the joints of the pipes or pipe fittings, bolts, etc. If the soil at the site of the thrust block is of a poor or unsuitable nature, the City Engineer may require said unsuitable material to be removed and replaced with Granular Borrow or other material approved in writing by the City Engineer or he may require the thrust blocking to be increased in size to provide the necessary blocking and restraint required. There shall be no separate measurement and payment made for thrust blocking and the cost shall be included in other bid items.

605.08 - Valve Installation

Minimum valve spacing along main lines shall be seven hundred (700) feet unless otherwise approved by the City Engineer.

Valves placed at street intersections shall be moved back from the cross to the curb and gutter point of radius as shown in the Standard Drawings.

All valves shall be inspected upon delivery in the field to insure proper working order before installation. They shall be set and jointed to the pipe in the manner as set forth in the AWWA Standards for the type of connection ends furnished. The valves shall also be carefully inspected for injury to the outer protective coatings. At all places where the coatings have been rubbed or scraped off, the damaged area shall be thoroughly cleaned to expose the iron base metal. The cleaned area shall then be coated with two (2) or more field coats of bitumastic coating.

All main line valves shall be placed as shown in the Standard Drawings or as otherwise directed by the City Engineer. All valve operating nuts shall be installed in a vertical position and be provided with a cast iron valve box so arranged that no shock will be transmitted to the valve. Where the valve operating nut is installed at depths in excess of six (6) feet of finished grade, an extension stem of sufficient length shall be installed, so that the top of the extension is within eighteen (18) inches of the finished surface grade.

After installation, all valves shall be subjected to a field test for piping as outlined in the section on TESTING of these Specifications. Should any defects in design, materials or workmanship appear during these tests; the Contractor shall correct, at his expense, such defects with the least possible delay and to the satisfaction of the City Engineer. Should the Contractor fail to correct the defect within a reasonable period of time in the judgment of the City Engineer, the City Engineer may cause such defects to be corrected and deduct the cost thereof from any monies or payment due to the Contractor.

Valve installations or adjustments shall be clean of debris and shall allow a wrench to be placed on the nut for turning to both the fully open and fully closed positions. Valves that cannot be fully opened or closed shall be corrected at the Contractor's expense.

605.09 - Valve Box Installation

Valve boxes are set to position during backfilling operations so they will be in a vertical alignment and centered over with the valve operating nut and stem. The lower portion of the unit is installed first in such a manner that it is cushioned and does not rest directly on the body of the valve or upon the water line. The upper portion of the unit is then placed in proper alignment with the operating stem and to such elevation that its top will be at finished surface grade. Backfill material around both units shall be placed and compacted to the satisfaction of the City Engineer.

605.10 - Hydrant Installation

605.10.1 - Fire Hydrants

Fire hydrant spacing shall conform to the Fire Code currently adopted by the City of Idaho Falls at the time of installation.

All fire hydrants shall be inspected upon their arrival in the field to insure a proper working condition. Fire hydrants shall be installed in a vertical position, not to exceed one hundredth (0.01) foot horizontal offset per foot of vertical rise. After installation, they shall be subjected to a hydrostatic test not to exceed the factory test pressure.

Fire hydrant laterals shall consist of a six (6) inch pipe from the fire hydrant unit to the tee connection at the main line and shall include an auxiliary gate valve set vertically and placed in the line a maximum of five (5) feet from the centerline of the main line to the centerline of the valve. All fire hydrant, gate valve and tee joints at the main shall require joint restraints if the fire hydrant must be placed in service before the placement of thrust blocks and backfill.

All fire hydrants shall be set on a concrete block as shown on the Standard Drawings with the hose nozzles at least eighteen (18) inches but not more than twenty-four (24) inches above finished surface grade. The bottom of the breakoff flange shall be a minimum of two (2) inches above finished surface grade. The minimum clearance between the back of curb and the steamer nozzle of the fire hydrant shall be eighteen (18) inches. The fire hydrant wastewater shall drain into a pit of crushed stone or gravel located at the base of the fire hydrant as shown on the Standard Drawings.

605.10.2 - Reset Existing Fire Hydrant

When Reset Existing Fire Hydrant is specified, it is intended that the hydrant unit itself shall be relocated without changing the location of the existing hydrant lateral tee at the main. Fire hydrant resetting shall meet all the requirements set forth herein for fire hydrant installation.

605.10.3 - Relocate Existing Fire Hydrant

When Relocate Existing Fire Hydrant is specified, the existing fire hydrant assembly shall be moved to a completely new location. When a new tee is installed in the main line at the new location, the existing fire hydrant lateral tee shall be securely plugged. Fire hydrant relocation shall meet all the requirements set forth herein for fire hydrant installation.

605.10.4 - Reconnect Existing Fire Hydrant

When Reconnect Existing Fire Hydrant is specified, the location of the fire hydrant unit itself shall remain unchanged at its existing position, but the existing fire hydrant lateral line connection at the existing main line shall be changed (either shortened or extended) and the so shortened or lengthened fire hydrant lateral line reconnected to the new tee (or cross) provided in the new main line at its new location. Fire hydrant reconnection shall meet all the requirements set forth herein for fire hydrant installation.

605.10.5 - Vertical Fire Hydrant Extensions

Vertical fire hydrant extensions shall not be allowed unless approved by the City Engineer. The minimum requirement for all flanged fire hydrant barrel extensions, in design, material and workmanship shall conform to the AWWA Standard for such castings. The drilling of the flanges on the extension shall match the drilling of the flanges on the fire hydrant. Extensions shall be made with the minimum number extensions to raise the fire hydrant to the proper finished grade height.

605.10.6 - Flush Hydrant Installation

All flush hydrants shall be inspected upon their arrival in the field to insure a proper working condition. Flush hydrants shall be installed between the last service and the plugged end of a permanent dead-ended waterline, and shall be installed between two (2) feet and five (5) feet from the plugged end of said dead-ended waterline. Installation of flush hydrants shall be in accordance with these Specifications and the Standard Drawings.

605.11 - Abandonment or Removal of Existing Water Lines

When abandonment or removal of existing water lines is required, the Contractor shall not remove the old pipe until all service connections have been

transferred to the new main. The Contractor shall make adequate provisions during construction for the care and protection of mains or services in use.

605.11.1 - Abandonment

When Abandon Existing Water Line is specified, the water line shall be left in place, the open ends plugged or capped by methods approved in writing by the City Engineer.

605.11.2 - Removal

When Remove Existing Water Line is specified, the water line together with all appurtenances shall become the property of the City. The Contractor shall remove the designated water line to the limits so stipulated and dispose of it as instructed by the City Engineer.

605.11.3 - Salvage

When Salvage Existing Water Line is specified, the water line together with all appurtenances shall become the property of the City. The Contractor shall use salvage methods that shall save all materials intact and undamaged. The salvaged materials shall be stored at the trench side for removal by the Contractor to those locations as specified on the Plans or Special Provisions.

605.12 - Restoration and Clean Up

The Contractor shall restore surface improvements such as pavement, curb and gutter, and other like surface facilities that have been removed or damaged during construction of the water line. If there is no specific bid item in the Contract for such restoration work, then all restoration and clean up shall be considered as incidental to the construction and all costs thereof shall be included by the Contractor in other bid items of the Contract.

The City may, if provided for in the Special Provisions, prefer to do all the restoration and clean up with its own forces.

605.13 - Water Main Access Structure

The Water Main Access Structure shall be constructed at the location depicted in the Plans and as shown in the Standard Drawings.

606 - DISINFECTION

Before being placed in service all new water lines and repaired portions thereof or extensions to existing mains shall be chlorinated in accordance with AWWA C-651 and a satisfactory bacteriological report obtained. The Contractor shall be responsible for taking a water test sample (said sample taking witnessed by the City), obtaining the results of this test and reporting it to the Water Superintendent and/or the City Engineer. No separate payment will be made for chlorinating water lines or for the testing associated therewith.

606.01 - Flushing

Newly installed sections of pipe to be disinfected shall first be flushed to remove any solids or contaminated material that may have become lodged in the pipe. Flushing may occur either before or after disinfection of the pipe dependent upon the method of disinfection used as detailed in Subsection 606.02. If no hydrant is installed at the end of the main, then a tap shall be provided large enough to develop a velocity of at least three and one-half (3.5) feet per second in the main. End of line plugs shall not be tapped for main line flushing.

Taps required for chlorination or flushing purposes shall be provided by Contractor at the Contractor's expense. Service taps or taps that are necessary to provide for temporary or permanent release of air will also be provided by the Contractor at no additional expense to the City.

The Contractor shall be responsible for the disposal of treated water flushed from mains and shall neutralize the wastewater for the protection of aquatic life in the receiving water before disposal into any natural drainage channel shall be permitted. However, disposal may be made to any available sanitary sewer provided the rate of disposal will not overload the sewer.

606.02 - Requirement for Chlorination

Before being placed into service, all new mains and any repaired portions thereof or any extensions to existing mains shall be chlorinated as per AWWA C-651, so that a chlorine residual of not less than ten (10) parts per million remains in the water after it has been left standing for twenty-four (24) hours in the pipe. The initial chlorine content of the water shall be not less than fifty (50) parts per million or more than two hundred (200) parts per million. If the Water Superintendent determines that time constraints do not permit the retention period of twenty-four (24) hours, the slug method of chlorination as specified in AWWA C-651, will be allowed.

606.02.1 - Dry Calcium Hypochlorite

Where dry calcium hypochlorite is used for disinfection of the pipe, flushing shall be done after disinfection. As each length of pipe is laid, sufficient

high test calcium hypochlorite, sixty-five to seventy (65 - 70) percent chlorine, shall be placed in the pipe to yield a dosage of not less than fifty (50) parts per million available chlorine calculated on the volume of water which the pipe and its appurtenances will contain. The City Engineer shall establish application quantity of high-test calcium hypochlorite.

606.02.2 - Liquid Chlorine

Where liquid chlorine is used for disinfection of the pipe, flushing shall be done prior to disinfection. Liquid chlorine, a mixture of water and chlorine may be applied by means of a solution feed chlorinating device or the dry gas may be fed directly through proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solutions of chlorine gas or the gas itself must provide means for preventing the backflow of water into the chlorine.

606.02.3 - Application

The preferred point of application of the chlorinating agent is at the beginning of the pipeline extension or any valve section of it and through a corporation stop inserted by the Contractor in the horizontal axis of the pipe. The water injector for delivering the chlorine bearing water into the pipe should be supplied from a tap made by the Contractor on the pressure side of the valve controlling the flow into the pipeline extension. Alternate points of application may be used when approved or directed by the City Engineer.

Water from the existing distribution system or other source of supply, shall be controlled to flow very slowly into the newly laid pipeline during application of the chlorine. Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Check valves may be used if desired.

606.02.4 - Chlorinating Valves and Hydrants

In the process of chlorinating the newly laid pipe, all valves, hydrants and other appurtenances within said "new" system shall be operated while the pipeline is filled with the chlorinating agent and under normal operating pressure.

606.03 - Final Flushing and Testing

Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe until replacement water throughout its length shows, upon testing, less than zero-point-eight (0.8) parts per million chlorine residual. In the event chlorine is normally used in the source of supply, the test shall show a residual not in excess of that normally carried in the system. A flushing time shall be calculated by the Contractor and the flushing time shall not be less than the calculated requirement.

After flushing, the Contractor shall be responsible for taking a water test sample (said sample taking witnessed by the City), obtaining a bacteriological test from the State Health Authorities and reporting the test results to the City Engineer.

606.04 - Repetition of Flushing and Testing

Should the initial chlorination treatment result in an unsatisfactory bacterial test, the original chlorination procedure shall be repeated by the Contractor, at the Contractor's expense, until satisfactory results are obtained. Failure to achieve satisfactory test results shall be considered as a failure of the Contractor to keep the pipe clean during construction or to promptly chlorinate the main and no additional payment will be made for the reflushing and rechlorinating necessary to achieve the satisfactory test results.

606.05 - Activation of New Water System

No newly constructed water system shall be activated into the City's main water system until the City has received an acceptable bacteria test from the State Health Authorities. The line shall not be used or its contents be allowed to enter existing lines. The activation of the new water system shall only be done by permission of the Water Superintendent or his representative.

609 - MEASUREMENT AND PAYMENT

Trench excavation and backfill will be measured and paid for separately under its respective bid item(s) under the Specifications for Trench Excavation and Backfill. The removal and replacement of concrete curb and gutter, concrete sidewalk and street surfacing will be measured and paid under their respective bid item(s) under the Specifications for Portland Cement Concrete. However, if no bid item is in the Contract, payment for these items shall be part of the bid item for which they were performed and no additional compensation shall be awarded.

609.01 - Temporary Water Service

609.01.1 - Measurement

Temporary water service during replacement construction shall be measured on a LUMP SUM basis complete as stated in these Specifications.

609.01.2 - Payment

Temporary water service shall be paid at the Contract unit price bid on a LUMP SUM basis. This lump sum payment shall be full compensation for furnishing all labor, materials, equipment, Contractor responsibility and all other items required for a complete and workable temporary water service operation that is required, regardless of level of effort required, length of time, delays for construction, weather or other circumstances.

609.02 - Pipe

609.02.1 - Measurement

Water line Pipe of the various sizes (diameters) shall be measured on a LINEAR FOOT basis on the slope distance along the top of the pipe. No deductions will be made for the linear length of any fittings, valves, couplings, etc. contained within the measured length. Where changes in pipe size are accomplished by means of a reducer, the point of measurement separating the two (2) sizes shall be made at the midpoint of the reducer. Where two (2) pipes (of the same or different sizes) intersect one another at a tee or cross, the length measurement shall be to the intersection of the centerlines of the two (2) pipes.

609.02.2 - Payment

The various sizes of water line Pipe will be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be full compensation for all labor, equipment, tools and materials required to dewater the trench, furnish, lay, jointing, conductivity, disinfect, test and any and all other work needed to complete the installation of the water line Pipe in place.

609.03 - Valve and Valve Box

609.03.1 - Measurement

The various size of Valve shall be measured on a PER EACH basis. The measurement shall include the valve box, cover, extension stem, etc. as may be required to provide a complete operative unit.

609.03.2 - Payment

The various size of Valve and cast iron Valve Box shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment, tools necessary to furnish and install, including all jointing, disinfecting, hydrostatic testing, etc. the Valve and cast iron Valve Box complete in place and connected into the water line.

609.04 - Fittings and Appurtenances

609.04.1 - Measurement

The various kinds and sizes of Fittings and Appurtenances, such as tees, plugs, crosses, reducers, etc. shall be measured on a PER EACH basis. The measurement shall include any thrust blocks, joint restraints, etc. to install the complete Fitting or Appurtenance.

609.04.2 - Payment

The various kinds and sizes of Fittings and Appurtenances shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment, tools necessary to furnish and install, including all jointing, disinfecting, hydrostatic testing, etc. the Fitting or Appurtenance complete in place and connected into the water line.

609.05 - Hydrants

609.05.1 - Measurement for Fire Hydrant

Fire Hydrant shall be measured on a PER EACH basis. The measurement shall include any and all associated items such as thrust blocks, ties, concrete blocks, joint restraints, gravel sump, etc., as may be required to provide a complete operative unit.

609.05.2 - Payment for Fire Hydrant

Fire Hydrant shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install, including tie rods, concrete blocks, thrust blocks, course gravel sump, painting, etc. the Fire Hydrant complete in

place and connected to the water line. However, the six (6) inch pipe, the required main fitting connection (tee or cross) connecting the hydrant to the main and the auxiliary gate valve and box shall be paid at their respective Contract unit bid prices.

609.05.3 - Payment for Resetting Existing Fire Hydrant

Resetting Existing Fire Hydrant shall be paid at the Contract unit price bid the same as for Fire Hydrant. The payment shall also include the cost of removing the existing fire hydrant, installing any other fittings, appurtenances and pipe needed to reset the hydrant.

609.05.4 - Payment for Relocating Existing Fire Hydrant

Relocating Existing Fire Hydrant shall be paid at the Contract unit price bid the same as for Fire Hydrant. The payment shall also include the cost of removing the existing fire hydrant unit, the existing hydrant lateral line (from the hydrant to the main), the existing gate valve, box and cover on the hydrant lateral line and to then relocate and reinstall these facilities at the designated fire hydrant location. The payment shall also include plugging the open end of the tee (or cross) at the location from which the fire hydrant, its lateral line and valve were removed.

609.05.5 - Payment for Reconnecting Existing Fire Hydrant

Reconnecting Existing Fire Hydrant shall be paid at the Contract unit price bid the same as for Fire Hydrant. The payment shall also include the cost of disconnecting the hydrant lateral at the existing main, shortening or lengthening the hydrant lateral as required, reconnecting the hydrant lateral to the new main, replacing the hydrant valve to its proper position off of the new main and any and all other work necessary to reconnect the hydrant, its lateral line and valve to the new water line.

609.05.6 - Payment for Vertical Fire Hydrant Extension

Vertical Fire Hydrant Extension shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall include the castings together with the additional length of hydrant rods, bolts, nuts, washers, gaskets and any other required materials. The price bid per linear foot shall cover the cost of all machine work and all labor required to lengthen the rods and there shall not be any additional compensation for such work.

609.05.7 - Measurement for Flush Hydrant

Flush Hydrant shall be measured on a PER EACH basis. The measurement shall include any and all associated items such as tapping saddle, corp stop, curb stop, curb box, valve boxes, nipples, fittings, gravel sump, etc., as may be required to provide a complete operative unit.

609.05.8 - Payment for Flush Hydrant

Flush Hydrant shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install tapping saddle, corp stop, curb stop, curb box, valve boxes, nipples, fittings, gravel sump, etc., Flush Hydrant complete in place and connected to the water line.

609.06 - Service Line and Connection

609.06.1 - Measurement

Pipe for Service Line shall be measured on a LINEAR FOOT basis for the various sizes specified.

Service Line connection shall be measured on a PER EACH basis for the various sizes specified. The measurement shall include, but not necessarily be limited to furnish the tap, tapping saddle, corporation, curb stop, curb box, etc. and completing the connection from the main to the curb stop (plus ten (10) feet behind property line at vacant properties) and/or existing service lines using the necessary fittings required by the size of the specific service complete and in place.

609.06.2 - Payment for Service Line

The various size of pipe for Service Line shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be full compensation for all labor, equipment, tools and other materials required to furnish, lay, jointing, test and any and all other work needed to complete the installation of the pipe in place. No separate payment shall be made for SPECIAL PIPE ZONE MATERIAL for copper pipe and the cost shall be included in the unit bid price per linear foot for the pipe.

609.06.3 - Payment for Service Connection

Connection for service line shall be paid for at the Contract unit price bid on a PER EACH basis for the various size of the service line specified. The payment shall be full compensation for all labor, equipment and materials as may be required to satisfactorily complete the Connection of the service lines as specified. No separate payment shall be made for any appurtenances such as taps, tapping saddles, valves, corporations, curb stops, curb boxes, etc. as may be required to complete the Connection.

609.06.4 - Payment for Reconnecting Service Line

Reconnecting Service Line shall be paid at the Contract unit price bid on a PER EACH basis for the various size of the service line specified. The payment shall be full compensation for all labor, equipment and materials as may be

required to satisfactorily complete the reconnection of the service lines as specified. No separate payment shall be made for any pipe or appurtenances such as taps, tapping saddles, valves, corporations, curb stops, curb boxes, etc. as may be required to complete the reconnection. No separate payment shall be made for SPECIAL PIPE ZONE MATERIAL for copper pipe and the cost shall be included in the unit bid price per reconnection.

609.06.5 - Measurement for Meter Pit

Meter Pit shall be measured on a PER EACH basis for the various types specified, complete and in place.

609.06.6 - Payment for Meter Pit

Meter Pit shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be considered as full compensation for all labor, tools, materials and equipment necessary to install meter pits as shown in the Plans, as directed by the City Engineer and as specified in these Standard Specifications.

609.07 - Removal or Salvage of Water Line and Appurtenances

609.07.1 - Measurement

Removal or Salvage of Water Line shall be measured on a LINEAR FOOT basis along the centerline of the trench for the pipe.

Removal or Salvage of Water Line Appurtenances and fittings shall be measured on a PER EACH basis for the specified appurtenance or fitting. Where no separate bid item is provided for the removal of specific appurtenances or fittings, such appurtenances or fittings shall be included in the linear footage measured for the pipe attached thereto.

609.07.2 - Payment for Removal

Removal of water line shall be paid at the Contract unit price bid by the LINEAR FOOT for the size specified.

All appurtenances shall be paid at the Contract unit price bid on a PER EACH basis. Where no separate bid item is provided for the removal of specific fittings or appurtenances, the cost of the removal shall be included in the unit price bid for the removal of the water line attached thereto.

609.07.3 - Payment for Salvage

Salvaging of water line and appurtenances shall be paid at the Contract unit price bid the same as for Removal, except the City has the right to reject any material as unacceptable upon delivery.

609.08 - Water Main Access Structure

609.08.1 - Measurement

Water Main Access Structure shall be measured on a LUMP SUM basis complete and in place.

609.08.2 - Payment

Water Main Access Structure shall be paid at the Contract unit price bid on a LUMP SUM basis. The payment shall be considered as full compensation for all labor, tools, materials and equipment necessary to install Water Main Access Structure as shown in the Plans, as directed by the City Engineer, and as specified in these Standard Specifications. The 1-inch service connection and installation of the valve shall be considered incidental to this item. No separate payment will be made for this work.

**CITY OF IDAHO FALLS
PUBLIC WORKS DIVISION
ENGINEERING DEPARTMENT**

**STANDARD SPECIFICATIONS FOR
SANITARY SEWERS AND
STORM DRAINS
SECTION 700**

2010 EDITION

**STANDARD SPECIFICATIONS FOR
SANITARY SEWERS AND STORM DRAINS
2010 EDITION**

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SANITARY SEWERS AND STORM DRAINS

SECTION 700

700 - INTRODUCTION

These Specifications cover the pipe and appurtenances normally used for sewer collection systems. All materials, workmanship and installation of the Sewer Collection System shall be done in accordance with these Standard Specifications, the Plans and Special Provisions or as directed by the City Engineer. Any installation not conforming to the requirements shall be removed and replaced or repaired to the satisfaction of the City Engineer at the Contractor's expense. No work will be considered for acceptance until such repair or replacement is accomplished.

The terms "sewer" and "drain" in these Specifications shall be considered synonymous and what applies to one shall apply to the other unless specifically designated otherwise. The term "SERVICE LINE" in these Specifications shall be defined as a sewer line that serves a single building. The minimum size for service lines shall be four (4) inches.

The term "STUB LINE" shall be defined as any sewer line eight (8) inches in diameter or greater, not bounded by a manhole at either end.

The term "MAIN LINE" in these Specifications shall be defined as any sewer line that serves more than one building. The term "PRIVATE SEWER" in these Specifications shall be defined as any "MAIN LINE" which is installed on private property.

Specification references made herein for manufactured materials such as pipe, manholes, inlet boxes, and appurtenances refer to designations of the American Society for Testing and Materials (ASTM) or the American Water Works Association (AWWA) as referenced in the latest edition on the date of Plan approval. It is not intended that materials listed herein are to be considered equal or generally interchangeable for all applications. The City Engineer shall determine which materials are suitable for the Project and shall specify those materials in the Plans and/or Special Provisions.

The Contractor shall immediately submit written notice to the City Engineer of changes in Site Conditions, such as additional trench depth and/or width, bedding conditions and combinations thereof, which may require a higher class or type of pipe than that specified. Additional compensation shall not be awarded for any extra work resulting from such changed conditions unless prior

to performing such extra work the Contractor shall have submitted written notice of the changed conditions to the City Engineer and the City Engineer shall have given written authorization of the extra work. If such changed conditions are for the convenience of the Contractor's operations, any and all additional costs associated therewith shall be at the expense of the Contractor.

To ensure the integrity of the Sewer Collection System, all sewer lines connected to or intended to be connected to the system shall be constructed in accordance with these Specifications. However, the Specifications for Excavation and Backfill, Portland Cement Concrete Construction and any other work performed on private property shall apply only to the actual PIPE ZONE area of the constructed sewer line, as defined in the Specifications for Trench Excavation and Backfill. This requirement shall not imply any responsibility on the part of the City for the construction or maintenance of any privately owned sewer line or system.

701 - MATERIALS

Materials stronger than that specified herein may be furnished at the Contractor's option and at his own expense, provided such pipe conforms in all other respects to the applicable provisions of these Specifications.

701.01 - Pipe

All pipe shall be clearly marked with type, class, or thickness as applicable. Lettering shall be legible and permanent under normal conditions of handling and storage. All pipe shall have bell and spigot ends with flexible gasketed joints, unless otherwise specified. Each straight section of pipe for all sizes and classes shall not be less than four (4) feet in length, unless otherwise specified. The pipe supplier shall furnish the City Engineer with the pipe design used to determine necessary pipe strength, SDR and / or stiffness for the installation method, bedding, pressure and loading conditions encountered at the project site. Pipe design shall be submitted a minimum of ten (10) days prior to installation. Pipe shall not be installed without the City Engineers approval of the pipe design. The Contractor shall notify the City Engineer immediately if conditions at the project site differ significantly from those specified in the approved pipe design.

701.01.1 - Nonreinforced Concrete Pipe

Nonreinforced concrete pipe shall conform to the requirements of ASTM C 14, Class 3 or better except for cement as specified below. It shall be rated strong enough as may be required by the bedding, pressure and loading conditions encountered at the project site.

Cement used in the manufacture of concrete pipe shall conform to the requirements of ASTM C 150, Specifications of Portland Cement, except that the total alkali content, when determined as the mixed sulfate or sodium and potassium and calculated to sodium oxide, shall not be greater than six-tenths (0.6) of one (1) percent.

Acceptance of concrete pipe shall be based on the load-bearing test, material test, and inspection of the project during all stages of construction. Acceptance by cylinders or cores instead of load-bearing tests is permissible when agreed upon in writing by the Manufacturer and the City Engineer prior to manufacture.

Specimens for absorption and strength tests shall be selected by the City Engineer from pipe in the pipe manufacturer's yard or at the point of delivery to the Contractor. Tests shall be performed at no expense to the City on the specimens selected. The provisions of the applicable ASTM Standards shall apply in regard to the evaluations of such tests and the rejection or acceptance of

pipe. The City reserves the right to select the testing agency and the City's evaluation of the results of such tests shall be final.

In addition to the tests specified in the applicable ASTM Specifications, the City may make field leakage tests on any and all sections pipe to be installed. The field leakage test shall be in accordance with the following procedure:

The section of pipe to be tested shall be placed with either end of the pipe down on a sponge-rubber mat or other base that will permit a reasonable watertight enclosure at the bottom of the pipe. The section of pipe shall then be filled with water to the top. Any section of pipe in which actual movement of water through the walls can be detected shall be rejected. Damp spots on the outside of the wall that appear during the tests shall not be cause for rejection unless actual movement of water through the pipe wall can be detected.

701.01.2 - Reinforced Concrete Pipe

Reinforced concrete pipe shall conform to ASTM C 76, Class III or better, except for cement as specified in Nonreinforced Concrete Pipe. Testing shall be as specified in Nonreinforced Concrete Pipe. Pipe Strength shall be as required by installation method, the bedding, pressure and loading conditions encountered at the project site.

701.01.3 - Ductile Iron Pipe

Ductile iron pipe shall conform to the requirements of AWWA C 151 "Ductile Iron with Cement Lining", as specified in AWWA C 104. It shall be rated as Class 50 or stronger as may be required by the installation method, bedding, pressure, and loading conditions encountered at the project site.

701.01.4 - ABS Composite Pipe

ABS (acrylonitrile-butadiene-styrene) Composite pipe shall conform to the requirements of AASHTO M 264 or ASTM D 2680. Pipe strength parameters shall be as required by the installation method, bedding, pressure and loading conditions encountered at the project site.

701.01.5 - ABS Pipe

ABS (acrylonitrile-butadiene-styrene) pipe shall conform to the requirements of ASTM D 2751. Pipe strength parameters shall be as required by the installation method, bedding, pressure and loading conditions encountered at the project site.

701.01.6 - PVC Pipe

PVC (polyvinyl chloride) pipe shall conform to the requirements of ASTM D 3034 for Type PSM or ASTM F 679 for eighteen to forty-eight (18-48) inch diameters. Pipe strength parameters shall be as required by the installation method, bedding, pressure and loading conditions encountered at the project site.

701.01.7 - PVC Ribbed Pipe

PVC (polyvinyl chloride) ribbed pipe shall conform to the requirements of ASTM F 794. Pipe strength parameters shall be as required by the installation method, bedding, pressure and loading conditions encountered at the project site.

701.01.8 - PE Pipe

PE (polyethylene) pipe shall conform to the requirements of ASTM F 714. Pipe strength parameters shall be as required by the installation method, bedding, pressure and loading conditions encountered at the project site.

701.01.9 - HDPE Pipe

HDPE (high-density polyethylene) pipe shall conform to the requirements of ASTM F 667 and AASHTO M 294 Type S. It shall be rated with a pipe stiffness of forty-five (45) psi or greater as may be required by the bedding, pressure and loading conditions encountered at the project site.

701.01.9 - PP Pipe

PP (polypropylene) pipe shall be an impact modified copolymer conforming to the requirements of ASTM D 4101 and shall have a minimum pipe stiffness of forty-six (46) psi in accordance with ASTM F 2412. Joints shall be watertight and meet the requirements of ASTM D 3212 with gaskets meeting ASTM F 477.

701.02 - Joints

Gasket materials shall be stored in a cool, clean place protected from sunlight and contaminants until ready for installation on the pipe. All surfaces of the joint, upon or against which the gaskets may bear, shall be smooth, free from spalls, cracks, or fractures and imperfections that would adversely affect the performance of the joint. The joints of the pipe shall be of such design that they shall withstand forces caused by the compression of the gasket, when jointed, without cracking or fracturing. Rubber-type gaskets shall be the sole element depended upon to make the joint flexible and watertight.

701.02.1 - Concrete Pipe

Concrete sewer pipe shall have rubber-type gasket joints conforming to the requirements of ASTM C 443.

701.02.2 - Ductile Iron Pipe

Ductile iron pipe shall have rubber-type gasket joints conforming to the requirements of AWWA C 151.

701.02.3 - ABS Composite Pipe

ABS composite pipe shall have solvent cement joints conforming to the requirements of ASTM D 2680.

701.02.4 - ABS Pipe

ABS pipe shall have solvent cement joints conforming to the requirements of ASTM D 2751 or elastomeric joints conforming to the requirements of ASTM C 443.

701.02.5 - PVC Pipe

PVC pipe shall have solvent cement joints conforming to the requirements of ASTM D 2855 or elastomeric joints conforming to the requirements of ASTM F 477 and ASTM D 3212.

701.02.6 - PVC Ribbed Pipe

PVC ribbed pipe shall have elastomeric joints conforming to the requirements of ASTM F 477 and ASTM D 3212.

701.02.7 - PE Pipe

PE pipe shall have butt fusion joints conforming to the requirements of ASTM D 3261.

701.02.8 - HDPE Pipe

HDPE pipe shall have elastomeric gasket joints conforming to the requirements of ASTM F 477 and ASTM D 3212.

701.03 - Fittings and Appurtenances

701.03.1 - Main Lines

Manufactured fittings and appurtenances such as tees (except tapping tees), "Y"s, bends, crosses, etc., excepting caps or plugs, shall not be allowed in main lines except by written permission of the City Engineer.

701.03.2 - Service Lines

Bends of less than ninety (90) degrees shall be allowed in service lines for changes in vertical alignment. Bends shall be of the same material and with the same joint type as the service line. Tee and 'Y' fittings for connecting service lines to main lines shall be allowed if cast in place by the manufacturer or if field installed in accordance with Subsection 705.08. All other fittings in service lines shall be allowed only by written permission of the City Engineer.

Tee connections for field installation of service lines to main lines using a saddle type tap shall be "ROMAC INDUSTRIES CB SEWER SADDLE" or approved equal.

701.03.3 - Caps and Plugs

Caps and plugs shall be of the same material and with the same joint type as the connection, or of a type specified by the connection manufacturer as suitable for sealing the connection. The cap or plug shall be able to withstand all test pressures applied to the main sewer system without leaking. When later removed, it shall permit the continuation of the pipe installation with jointing similar to the joints in the already installed service line.

701.03.4 – Heat Shrink Sleeves

Heat shrink sleeves shall consist of Canusa Wrap (WL & WT Products), Canusa High Shrink WLOX, Raychem WPCT, Raychem WPC50 Raychem WPC65, Raychm WPC 100M or approved equal.

701.04 - Pre-Installation Testing

701.04.1 - System Pre-Qualification

This test is to pre-qualify a sanitary sewer or storm drain joint system for water tightness capabilities prior to installation. All components of the system shall meet the requirements of their respective sections. Material and test equipment for proof testing shall be provided by the manufacturer. The test method shall be the same as outlined in the section on TESTING for field-testing an installed system. Test specimens of the pipe furnished hereunder shall be submitted to the City Engineer upon request at no cost to the City.

701.04.2 - Material Certification

The pipe manufacturer or fabricator shall furnish appropriate certification, based upon the manufacturer routine quality control tests, that the material and pipe meet the requirements of the applicable specifications. Except as modified in these Specifications, the basis for acceptance of pipe under this Contract shall be as outlined under the applicable pipe specifications. If ten (10) percent of any

given type of pipe shall fail to meet the tests of requirements as specified, the City Engineer may reject all of that type of pipe from which the test sections were selected. Any further tests made after the original rejection of any given type of pipe shall be at the expense of the Contractor.

701.05 - Manholes

Manholes shall be constructed from standard precast concrete units or cast-in-place concrete units according to the following Specifications.

701.05.1 - Precast Manholes

Precast concrete manholes shall conform to ASTM C 478. Dimensions of precast barrel, cone section and flat lid shall conform to the details shown on the Standard Drawings. Cone section shall be of eccentric type and as designated by the City Engineer. Flat lid section shall meet HS25 loading requirements, or as designated by the City Engineer. A flexible pipe to manhole connection shall be used for all new Manhole Type I to pipe connections. Flexible pipe to manhole connections shall not be required for connecting to existing manholes or for pipe sizes greater than twenty-four (24) inches in diameter.

701.05.2 - Cast-In-Place Manholes

Cast-in-Place concrete manholes shall be used only with written permission of the City Engineer.

701.05.3 - Plastic Manholes

Plastic manholes shall be used only with written permission of the City Engineer.

701.05.4 - Manhole Rings and Covers

All manhole rings and covers shall be of the size and shape detailed in the Standard Drawings. Casting shall be tough, close-grained, gray iron free from blowholes. They shall conform to ASTM A-48 and shall be sound, smooth, clean, and free from blisters and all defects. All casting shall be machined to insure perfectly flat, smooth, even and true surfaces, particularly on the contact surfaces between the cover and the ring. All rings shall be equipped with adjusting bolts.

701.05.5 - Precast Manhole Extensions

When it becomes necessary to extend a manhole in order to match the existing or proposed street or ground surface grades, barrel section extensions shall be installed when possible to raise the top of the cone. If extension is still necessary after barrel extensions have been installed, then grade rings may be used, but in no case shall more than twelve (12) inches total height of grade rings be allowed.

A standard grade ring shall be six (6) inches in height; however, a minimum allowable ring height for concrete rings shall be two (2) inches. Plastic rings of lesser thicknesses may be allowed by written permission of the City Engineer.

701.05.6 - Pipe in Precast Manholes

Pipe for future sewer connections at manholes shall conform to the appropriate sections for pipe materials of these Specifications. Pipe for such stub outs shall be furnished in the shortest practicable length and of the size, type and strength class specified on the Plans or designated by the City Engineer.

701.05.7 - Jointing

Each barrel section, cone section or flat lid shall be connected together in accordance with the manufacturer's recommendation. The maximum exfiltration allowance shall be zero-point-one (0.1) gallons per hour per foot of diameter per foot of head.

701.05.8 - Standard Manholes

All manholes are intended to be standard manholes and shall be constructed in accordance with the Standard Drawings.

701.05.9 - Drop Manhole Connections

Drop manhole connections are designed to provide a vertical drop of the sewage flow and shall be constructed in accordance with the Standard Drawings.

Due to the unequal earth pressures that would result from the backfilling operation in the vicinity of the manhole, the entire outside drop connection shall be backfilled with non-shrink backfill.

701.05.10 - French Drain Manholes

French Drain Manholes, whenever required, shall be constructed in accordance with the Standard Drawings.

701.05.11 - Special Manholes

Special Manholes, whenever required, shall conform in all respects to the requirements for standard manholes, except for the special details and items as called for in the Plans and/or Special Provisions.

701.05.12 - Flexible Pipe to Manhole Connections

The connector shall be the sole element relied on to assure a flexible watertight seal between the pipe and manhole. The flowline between the

manhole and the pipe shall be nearly equal with alignment difference less than one-quarter (1/4) inch. No adhesive or lubricants shall be used to install the connector in the manhole. The connector rubber shall be in accordance with ASTM C923. All stainless steel elements of the connector shall be non-magnetic series 304 Stainless Steel, excluding the worm screw. The worm screw shall be Series 305 Stainless Steel. Connector clamps shall be tightened using manufacturer recommended methods. The connector shall be installed in the manhole using an expanding mechanism in strict accordance with the connector manufacturer. The connector shall be of the size specifically designed for the pipe being connected to the manhole. Pipe adapters for corrugated pipe and other pipe types shall be used as necessary to insure a watertight seal.

701.06 - Inlet Boxes

Inlet Boxes of the various types shall be constructed from standard precast concrete units or cast-in-place concrete units and shall be constructed in accordance with the Standard Drawings.

701.06.1 - Frames and Grates

The Frames and Grates used for the inlet boxes shall be constructed in accordance with the Standard Drawings. All frames shall be equipped with adjusting bolts.

701.07 - Lift Stations

Lift Stations shall be constructed from standard precast concrete units conforming to ASTM C 478. Dimensions of the precast barrel(s) and flat lid sections shall conform to the details shown on the Standard Drawings and / or Plans. Cast-in-place lift stations shall be used only with written permission of the City Engineer.

701.08 - Concrete

All concrete work and materials shall be in accordance with the Standard Specifications for Portland Cement Concrete.

701.09 - Grout

Grout shall be a "dry pack" non-shrinking type such as 'THORITE' or equal. All surfaces to be grouted shall be prepared with an epoxy bonding agent such as 'PRO BOND EPOXY ET-150' or equal.

704 - TESTING

All sanitary sewers and storm drains shall be tested after backfill by the exfiltration method, by the low pressure air method or as provided in the Special Provisions; however, where the natural ground water table is such as to preclude an adequate exfiltration test, the City Engineer may require infiltration tests. All lines shall be cleaned prior to testing.

All work involved in cleaning and testing sewer lines between manholes as required herein shall be completed within fifteen (15) working days after backfilling the sewer lines and structures, except as noted in Subsection 704.04. Any further delay will require the written consent of the City Engineer. The Contractor shall furnish, at his expense, all labor, materials, and tools and equipment necessary to make the tests, clean the lines, and perform all work incidental thereto. Precaution shall be taken to prevent joints from drawing apart during the tests. Any damage resulting from testing shall be repaired by the Contractor at his own expense. The manner and time of testing shall be subject to the approval of the Engineer.

All "Y's", tees, and stubs shall be plugged with flexible, jointed caps or other acceptable alternate caps or plugs securely fastened to withstand the internal test pressure. Such plugs or caps shall be readily removable and their removal shall provide a socket or joint suitable for making a flexible joint connection or extension.

In the event the Contractor elects to test twenty-four (24) inch or larger diameter pipe one (1) joint at a time, leakage allowances shall be converted from GPM per one hundred (100) feet to GPM per joint by dividing by the number of joints occurring in one hundred (100) feet.

If leakage exceeds the allowable amount, corrective measures shall be taken and the line then retested to the satisfaction of the City Engineer.

Testing of storm drains shall be the same as for sanitary sewers.

704.01 - Exfiltration Testing

The allowable leakage by exfiltration test shall be as follows:

Leakage from the pipe after backfill shall be no more than sixteen-hundredths (0.16) gallon per hour, per inch of inside diameter of pipe, per one hundred (100) linear feet of main lines, laterals, service lines, and stub outs, etc. when there is a minimum test pressure of six (6) feet of water column above the crown of the pipe at the upper end of the pipe test section. The length or size of the pipe system being tested shall be limited so that the pressure on

the invert of the pipe at the lower end of the pipe section being tested shall not exceed sixteen (16) feet of water column.

For each increase in pressure of two (2) feet of water over and above the basic six (6) feet of water measured above the crown of the pipe at the low end of the test section, the allowable leakage shall be increased by ten (10) percent. Where it is impossible to attain a six (6) foot water column above the crown of the pipe at the highest end of the pipe test section, the allowable rate of leakage will be calculated by direct proportion between the height of water column actually attained versus the six (6) feet of water column normally required for the test.

The Contractor may fill the pipe with water at any time up to twenty-four (24) hours prior to the time of the exfiltration test to permit normal absorption into the pipe walls. The Contractor shall furnish, at his expense, all equipment, materials and labor necessary for making the exfiltration test. Any arrangement for test equipment that will provide accurate means of measurement shall be approved by the City Engineer. The exfiltration test shall be made by the Contractor in the presence of the Engineer or his designated representative.

704.02 - Infiltration Testing

Where the natural ground water table is above the crown of the higher end of the section of pipe to be tested, the maximum allowable limit of infiltration shall be one-tenth (0.1) gallon per hour, per inch of internal diameter of pipe, per one hundred (100) feet of length of all main lines, service line, laterals, etc. with no allowance for external hydrostatic head.

704.03 - Low - Pressure Air Testing

704.03.1 - Systems Constructed of Air-Permeable Materials

Pipelines may be tested with low-pressure air in lieu of water exfiltration testing. At the Contractor's option, the pipe may be tested without pre-wetting. The test equipment to be used for the low pressure air testing shall be furnished by the Contractor and shall be inspected and approved in writing by the City Engineer prior to use. The City Engineer or his Inspector may at any time require a calibration test of the gauges or other instrumentation that is incorporated in the test equipment.

The air supply hose for conducting a low-pressure air test shall be limited in size. A one-quarter (1/4) inch diameter air supply hose shall be required for use in testing eight (8) inch and ten (10) inch pipe and a one-half (1/2) inch diameter air supply hose shall be required for use in testing twelve (12) inch through twenty-four (24) inch pipe.

The Contractor shall provide a gauge with one (1) PSI increments and sufficient line so that readings are not taken within the trench.

The acceptable test requirement for the Low Pressure Air Test shall be of a “go, no-go” test. An example of a “go, no-go” test would be where both ends of the test section are sealed, the pressure brought up slowly to four (4) PSIG and the air source turned off. When and if the pressure is brought up to four (4) PSIG, then the pipe section under test would be acceptable.

Plugs used to close air-permeable pipe materials for the low-pressure air test must be securely braced to prevent unintentional release of a plug that can become a high-velocity projectile. Gauges, air piping, manifolds, and valves shall be located at the top of the ground. No one shall be permitted to enter a manhole or trench where a plugged pipe is under pressure. Four (4) pounds (gauge) air pressure develops a force against the plug in a twelve (12) inch diameter pipe of approximately four hundred fifty (450) pounds. Air testing apparatus shall be equipped with a pressure release device, such as a rupture disk or a pressure relief valve, designed to relieve pressure in any pipe under test at a six (6) PSIG reading. **IT IS NOT RECOMMENDED THAT ANY PIPE FORTY-EIGHT (48) INCHES AND LARGER BE LOW-PRESSURE AIR TESTED.**

The recommended procedure for conducting an air test by the Low Pressure Air Test Method is as follows:

1. The maximum reach to be tested in one (1) operation shall be the reach between two (2) consecutive manholes. Plug all pipe outlets with suitable test plugs. Brace each plug securely.
2. All gauge pressures in the test should be increased by the amount of ground water pressure at the center of the pipe.
3. Add air slowly to that portion of the pipe installation under test until the internal air pressure is raised to four (4.0) PSIG.
4. After an internal pressure of four (4.0) PSIG is obtained, allow at least two (2) minutes for air temperature to stabilize, while adding only the amount of air required to maintain the indicated four (4.0) PSIG pressure.
5. After the two (2) minute stabilization period, disconnect the air supply.

If the pipe section under test fails to build pressure to four (4) PSIG and all sources of air leakage have been corrected and there is still difficulty in meeting the requirements of the Low Pressure Air Test Method, then a water infiltration or exfiltration test shall be conducted to determine the acceptability of the pipe section under test.

704.03.2 - Systems Constructed of Non-Air Permeable Materials

When non-air permeable pipelines are subjected to the low-pressure air test, all of the provisions of the section on testing SYSTEMS CONSTRUCTED OF AIR PERMEABLE MATERIALS shall apply.

704.04 - Deflection Tests for Plastic Pipe

All sanitary sewers and storm drains constructed of plastic pipe less than twenty-four (24) inches in diameter shall be deflection tested, unless excluded by written permission of the City Engineer, not less than thirty (30) days after trench backfill and compaction has been completed. Camera inspections shall be used in place of mandrel testing for pipe over twenty-four (24) inches.

The tests shall be conducted by pulling a solid, pointed mandrel through the completed pipeline by hand. The diameter of the mandrel shall be ninety-five (95) percent of the pipe diameter. Stub lines may be mandreled immediately after line backfill and compaction has been completed.

The mandrel shall:

1. Be a rigid, nonadjustable, odd-numbering-leg mandrel with nine (9) legs minimum and have an effective length not less than its nominal diameter.
2. Have a minimum diameter at any point along the full length that is ninety-five (95) percent of the diameter of the pipe being tested.
3. Be fabricated of steel, be fitted with pulling rings at each end, be stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size, and mandrel OD (e.g., PVC, D 3034- 8" - 7.524"; ABS Composite D 2680-10"-9.584").

Testing shall be conducted on a manhole-to-manhole basis and shall be done after the line has been completely flushed out with water. The Contractor shall be required, at his expense, to locate and repair any sections of pipe failing to pass the test and then retest the section. All costs incurred by the Contractor attributable to mandrel and deflection testing, including any delays, shall be borne by the Contractor at no cost to the City.

704.05 - Television Inspection

The City may require any and all sewer lines to be inspected by the use of a television camera before final acceptance. The City shall pay the costs of the initial television inspection unless otherwise provided for in the Special Provisions.

The Contractor shall be responsible for all costs incurred in correcting any deficiencies found during the television inspection(s) and the cost(s) of any additional television inspection(s) to verify the satisfactory correction of any deficiencies. The Contractor shall also be responsible for any cost to clean the lines prior to any television inspection(s). The Contractor shall be responsible for all costs incurred in any television inspection performed solely for the benefit of the Contractor.

705 - CONSTRUCTION

This section covers the installation of the sanitary sewer or storm drain pipe, manholes, inlet boxes, lift stations and related appurtenances. The construction of these lines and facilities shall be in accordance with the manufacturer's specifications and instructions for installation, these Specifications or as directed by the City Engineer. The Contractor shall provide all tools and equipment including any special tools designed for installing each particular type of pipe used.

The type and gradation of the material used in bedding, haunching and initial backfilling as well as the manner and care with which it is installed are important factors in achieving satisfactory installation of the pipe. The amount of deflection that can be anticipated during or after the installation is related to the pipe stiffness and gradation of the embedment material, as well as the care with which it is placed and compacted under, around, and over the pipe, and the use and removal of the trench supports.

The City Engineer will provide survey line and grade control hubs in a manner consistent with accepted practices. The Contractor shall give the City Engineer forty-eight (48) hours notice of the time and place he will require the laying out and staking of any portion of the work. The Contractor shall carefully preserve all stakes, marks, and etc. In case of his carelessness, unnecessary destruction, or the removal by him or his employees of such stakes, marks, and etc., the City Engineer at the Contractor's expense shall replace the same. The Contractor shall be responsible for adequately and correctly transferring the lines and grades established by the City Engineer to the structure or other facility being constructed or installed.

The Contractor shall consistently check the line and grade of the facilities being constructed and in the event they do not meet the specified limits described hereinafter, the work shall be immediately stopped, the City Engineer notified in writing, and the cause remedied before proceeding with the work.

Minimum and maximum grades for sewer mainlines shall be as defined in the following table:

Pipe Size	Minimum Grade		Maximum Grade	
	(Inches)	(ft/ft)	(%)	(ft/ft)
8	0.004	0.40%	0.065	6.50%
10	0.0028	0.28%	0.047	4.70%
12	0.0022	0.22%	0.038	3.80%
15	0.0015	0.15%	0.027	2.70%
18	0.0012	0.12%	0.022	2.20%
21	0.001	0.10%	0.018	1.80%
24	0.0008	0.08%	0.015	1.50%
27	0.0007	0.07%	0.012	1.20%
30	0.0006	0.06%	0.011	1.10%
36 and Larger	0.0005	0.05%	0.008	0.80%

All dead end cul-de-sac lines shall be installed to a minimum grade of one (1) percent.

705.01 - Bypass Pumping

When construction is required of an existing segment of main line pipe that is currently carrying raw sewage or wastewater, bypass pumping shall be required of the raw sewage or wastewater to allow proper construction of the replacement main line pipe.

The Contractor shall utilize such equipment for bypass pumping that is capable of handling the volume of raw wastewater present and shall also be capable of passing solids so as to avoid debris buildup in the existing sewer main line. Equipment shall be thoroughly maintained and kept in an operable condition to avoid raw wastewater backups from inoperable equipment. Standby equipment shall also be on hand for use in case of emergency. The Contractor is free to choose his own method and equipment for bypass pumping; provided, however, that the method shall be demonstrated to be feasible and work properly prior to starting construction and shall be acceptable to the City Engineer. The Contractor shall also be required to have a spill containment plan in place prior to bypass startup. In addition, any spills that may occur as a result of bypass pumping shall be the responsibility of the Contractor to clean in conformance with those requirements enforced by the Idaho Department of Environmental Quality. Close coordination with the City's Sewer Department will be required to minimize adverse impact on sewer system operations and surrounding private property.

Pneumatic or other plugs approved by the City Engineer that are capable of stopping the raw wastewater stream in existing sewer main lines shall be incorporated with the bypass pumping equipment. The raw wastewater shall be blocked and bypassed in the nearest manhole upstream from the segment where the new replacement construction work is being done. The bypass pumping shall terminate at an appropriate downstream location where the raw wastewater can be disposed of without interfering in any way with current construction activities or sewer system operations. The Contractor shall alert all affected property owners in the segment being worked on, about the lack of sewer service and shall request that sewer use be curtailed or minimized until construction of the new segment is complete.

If overland pipelines or hoses are used for bypass pumping, they shall be located and placed in a manner to minimize interference with pedestrian and vehicular traffic. Appropriate signing and barricading in accordance with MUTCD shall be incorporated to mark street crossings and pumping equipment locations in the streets.

Bypass pumping shall be continuous as required during the period of construction. However, with the approval of the City Engineer, methods may be utilized to transition between the existing sewer main line and the newly constructed sewer main line at the end of each working day and on holidays and weekends in order to reduce required time for bypass pumping to the minimum necessary. This type of situation shall be monitored by the Contractor to assure proper wastewater flow during non-construction periods.

The Contractor shall be entirely responsible for the methods and results of the bypass pumping operation. The Contractor shall also take responsibility for property damage if it should occur, due to failure of pumping equipment, inattention by the Contractor, inadequate pumping facilities, flow backups during non-construction time, etc. Accordingly, the Contractor shall indemnify and hold harmless the City from any and all damages or claims arising from the wastewater bypass pumping operations.

705.02 - Excavation and Backfill

All excavation and backfill shall be performed in accordance with the Specifications for Trench Excavation and Backfill unless otherwise noted in these Specifications or as directed by the City Engineer.

705.02.1 - Dewatering

Where water is encountered in the trench, it shall be removed during pipe laying operations and the trench so maintained until provisions are made to prevent the floating of the pipe. Dewatering shall be completed prior to any pipe laying and joining and shall be carried out so that it does not destroy or weaken the strength of the soil under the pipe or along side of the trench. There shall be

no separate payment for dewatering. The cost of dewatering shall be included in the cost of the pipe installation.

705.02.2 - Bedding and Backfill for Plastic Pipe

The Contractor shall furnish SPECIAL PIPE ZONE MATERIAL for placement in the PIPE ZONE for all plastic pipe. Bedding and backfill for plastic pipe shall be in accordance with the Section on Backfill for Plastic and Copper Pipe in the Specifications for Trench Excavation and Backfill. There shall be no separate payment for bedding and backfill for plastic pipe. The cost of bedding and back fill shall be included in the cost of the pipe installation.

705.03 - Pipe

The pipe shall be installed to the established line and grade in the trench only after the trench has been dewatered and the pipe foundation and/or bedding has been prepared in accordance with the applicable Specification and Plan requirements. The pipe and fittings shall be inspected for defects. All pipe and fittings shall be carefully lowered into the trench, piece by piece, by means of a derrick, ropes, or other suitable tools or equipment in such a manner as to prevent damage to the sewer line materials. Under no circumstances shall sewer and storm line materials be dropped or dumped into the trench or onto the ground.

When the installed pipe has less than two (2) feet of cover material, as measured at the bell, the piping material shall either be Class V reinforced concrete pipe or Class 50 ductile iron pipe and used only upon written permission of the City Engineer.

The pipe shall be laid up grade from the point of connection at the existing pipeline or from a designated starting point and with the bell-ends facing the direction of laying or as directed by the City Engineer. Dirt and other foreign material shall be prevented from entering the pipe or pipe jointing during the handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned, and relayed. When pipe laying is not in progress, the forward end of the pipe shall be kept tightly closed with a temporary plug or by other means approved in writing by the City Engineer.

All laid pipe shall be retained in its proper position by mechanical or other means or methods approved by the City Engineer, so as to maintain proper alignment and joint closure until sufficient backfilling has been completed around the pipe to adequately hold it in place. All openings in the pipe or fittings shall be sealed with a cap or plug approved in writing by the City Engineer.

705.03.1 - Pipe Markings

All concrete pipe shall have the classification clearly marked on it. The markings on reinforced concrete pipe indicating the minor axis on the elliptical reinforcement shall be placed in a vertical plane (top to bottom) when the pipe is laid.

705.03.2 - Line and Grade

All pipe shall be laid using a laser system approved by the City Engineer. The laser system shall be of a type specifically designed for use in pipe installation. The laser system shall be used for both horizontal and vertical alignment control. The pipe alignment shall conform to the prescribed line and grade as shown on the Plans and as staked by the City Engineer. Any variance from the established line and grade shall not be greater than one quarter (1/4) inch. Furthermore, any variance shall not result in a level or reverse sloping pipe invert.

705.03.3 - Pumice for Insulation

Pumice for insulation shall be used with written permission of the Engineer when the depth from the top of pipe to finish grade is such that the City Engineer determines that a possible freezing condition could develop during the winter season.

The Contractor shall furnish and install filter fabric or four (4) inch minimum rigid board closed-cell polystyrofoam insulation and pumice in accordance with these Specifications, Standard Drawings and in close conformity with the lines and grades shown on the Plans or as directed by the City Engineer.

705.04 - Pipe Jointing

All pipe shall have flexible, gasketed joints unless otherwise specified. Pipe handling after the gasket has been affixed shall be carefully controlled to avoid disturbing the gasket and knocking it out of position, or loading it with dirt or other foreign material. Any gasket so disturbed shall be removed, cleaned and re-lubricated, if required, and replaced before any further pipe joining is started or continued.

Care shall be taken to properly align the pipe before joints are entirely seated or forced "home." During insertion of the spigot-end of the pipe, the pipe shall be partially supported by hand, sling, or crane, to minimize any unequal pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Since most flexible gasket joints tend to creep apart, when the end of the pipe is deflected and straightened, such movement shall be held to a minimum once the joint is "home."

Sufficient pressure shall be applied in making the joint to assure that the spigot-end of the pipe is “home” or properly seated as described in the installation instructions provided by the pipe manufacturer. At the end of the workday, the last pipe laid shall be blocked in an effective way to prevent creep.

705.04.1 - Joints of Dissimilar Pipe

For the connection of dissimilar pipe where manufactured adapter couplings, such as no-hub bands are available, they shall be installed in accordance with the Standard Drawings. If they are not available, the jointing shall be accomplished with special fabricated couplings, heat shrink sleeves, non-shrink concrete, expansion block, etc. as approved by the City Engineer.

705.04.2 - Joints of Plastic or Concrete Pipe to Existing Pipe at Manhole

When connecting plastic or concrete pipe using the method of “Plastic or Concrete Pipe Connection of Existing Pipe at Manhole” as shown in the Standard Drawings, the Contractor shall clean the area around the stub out back to the manhole base, so the City Engineer can inspect the stub out and its connection at the manhole. Upon receiving approval to use the existing stub out, the Contractor shall saw-cut the existing concrete pipe no more than twenty-four (24) inches from the manhole, connect the new pipe to the stub out using a “CAULDER” type coupling, or equal, including any rubber bushings for the proper pipe sizes and material. Then pour a concrete support block under the existing stub out, including the joint area to approximately six (6) inches past this joint. A concrete band, minimum of six (6) inches thick, shall then be placed around the remaining portion of this joint and it shall extend a minimum distance of six (6) inches on both sides of this joint.

705.04.3 - Solvent Cement Joints

Solvent cement joints shall be made in accordance with the manufacturer’s instructions, generally as follows:

1. Wipe clean the inside of the bell or sleeve coupling and the outside of the spigot-end of the pipe.
2. Apply the primer liberally to the inside of the bell or sleeve coupling and outside of the spigot-end.
3. Immediately apply the cement over the primer on the inside of the bell or sleeve coupling and on the outside surface of the spigot-end.
4. Immediately insert the spigot-end of the pipe into the bell or sleeve coupling with a slight circumferential twist.
5. Let dry or harden.

705.05 - Structure Connections

The connection of structures to pipe(s) shall be accomplished in accordance with the Standard Drawings. Such connections shall be left uncovered until after the acceptance inspection has been made.

When connecting plastic pipe to concrete structure using the method of "Plastic Pipe Connection to Concrete Structure" as shown in the Standard Drawings, the Contractor shall remove any existing pipe from the concrete structure. Then insert the new plastic pipe with an exterior gasket into the existing hole and grout the new pipe into place using a non-shrink grout material that will provide a water-tight concrete joint. Where necessary, the flowline through the base of the concrete structure shall be chipped out and reconstructed to fit the new grades of the pipe connections. All reconstruction shall conform to the requirements of the applicable Standard Drawings and/or detail as shown on the Plans.

Other types of connections shall be submitted to the City Engineer for consideration prior to installation.

705.05.1 - Manhole Connections

All openings in the walls of Type I Manholes shall be connected to pipe using connections that are in accordance with Subsection 701.05.12 - Flexible Pipe to Manhole Connections. All openings in the walls of Manholes that are not Type I and existing manholes shall, after the pipe or castings have been placed in their final position, be grouted tightly full in a workmanlike manner approved by the City Engineer, so as to ensure their watertightness. All such grouted joints shall be as indicated on the Standard Drawings or as approved by the City Engineer. The bell and spigot joint of concrete pipe for a grouted joint shall be located within twenty-four (24) inches of the outside wall of the manhole. This short pipe grouted connection for all pipe twenty-one (21) inches or less in diameter, shall be set on a firmly compacted earthen bedding and supported with concrete up to, but not including the joint. A short pipe connection shall not be required for flexible pipe to manhole connections.

In those areas where the manhole excavation is deeper than that of the adjacent sewer trench(es), special care shall be taken with the placement and compaction of the backfill material around the manhole to ensure that backfill material is properly and uniformly compacted to one hundred (100) percent of its standard maximum density below any pipe connections.

All plastic pipe shall be connected to the manhole in accordance with the Standard Drawings to ensure the watertightness of the connection or as approved by the City Engineer.

705.05.2 - Inlet Box Connections

All openings in the walls of inlet boxes constructed with precast sections (through which pipe connections are to be inserted) shall, after the pipe or castings have been placed in their final position, have a concrete collar and be grouted in a workmanlike manner approved by the City Engineer, so as to ensure their watertightness. All such joints shall be as indicated on the Standard Drawings or as approved by the City Engineer. The bell and spigot joint of concrete pipe shall be located within twenty-four (24) inches of the outside wall of the inlet box. This short pipe connection for all pipe twenty-one (21) inches or less in diameter shall be set on firmly compacted earthen bedding and supported with concrete up to, but not including the joint.

In those areas where the inlet box excavation is deeper than that of the adjacent sewer trench(es), special care shall be taken with the placement and compaction of the backfill material around the inlet box to ensure that said backfill material is properly and uniformly compacted to one hundred (100) percent of its standard maximum density below any such pipe connections to minimize the possibility that they may settle and break.

All plastic pipe shall be connected to the inlet box in accordance with the Standard Drawings to ensure the watertightness of the connection or as approved by the City Engineer.

705.06 - Caps and Plugs

Pipe branches, stubs, or other open ends that are not to be immediately connected, shall be sealed with a cap or plug as directed by the City Engineer. A two by four (2 x 4) inch wood post shall then be placed behind the cap or plug and extend approximately three (3) feet above the existing ground.

705.07 - Manholes and Inlet Boxes

All manholes and inlet boxes shall be constructed plumb and true in accordance with the details shown on the Plans or Standard Drawings.

All manholes within construction limits whether new installations, rehabilitations or grade adjustments shall be cleaned of all construction debris by the Contractor, at Contractor expense, upon completion of the work.

705.07.1 - Joints for Precast Wall Sections

Where walls are constructed using precast concrete sections, each section shall be set in a full bed of non-shrink grout or mastic.

705.07.2 - Cast-In-Place Manhole Bases

Cast-in-place manhole bases shall be at least six (6) inches in thickness and shall extend at least six (6) inches radially outside of the outside dimension of the manhole section. Before placing the manhole barrel sections, sufficient non-shrink grout or mastic shall be deposited on top of the concrete base so as to provide a watertight seal between the base and the manhole wall as shown on the Standard Drawings. Where water is encountered at the site, all cast-in-place bases or monolithic structures shall be placed on a one (1) piece waterproof membrane, so as to prevent any movement of water into the fresh concrete.

705.07.3 - Inverts

The invert shall conform to details shown on the Plans or on the Standard Drawings. Care shall be taken to construct the invert so as to provide smooth, flow-through characteristics. No sharp edges or rough sections that will tend to obstruct the flow shall be permitted. In general, the invert shall be constructed to a section identical with that of the lower half of the adjacent pipe. Where the size of pipe changes at manholes, the invert shall be constructed in the form of a smooth transition without abrupt breaks or unevenness of invert surfaces matching the lower half of each of the pipe. Where a full section of pipe is laid through a manhole, the top portion of the pipe shall be cut or broken out to or below the spring line of the pipe and the exposed edges of the broken pipe completely covered with non-shrink grout or concrete. The top surface of the manhole floor shall be sloped to drain towards the flowline as shown on the Standard Drawings.

During the construction of the invert section and for a time period of not less than twenty-four (24) hours following the placement of any concrete or non-shrink grout in the invert section(s), the Contractor shall temporarily divert any existing water flow so as to prevent damage to the fresh concrete or non-shrink grout.

705.07.4 - Grade Adjustment

The Contractor shall initially construct all new manholes and inlet boxes of the various types specified on the Plans, so that the tops are as close as practicable to the finished grade established by the City Engineer. Final adjustments of rings and frames for manholes and inlet boxes shall be by means of adjusting bolts and non-shrink grout as shown on the Standard Drawings. In no case shall more than twelve (12) inches total height of grade rings be allowed in the adjustment of manhole rings.

705.08 - Service Lines and Connections

The Contractor shall use special care and diligence when making field service line connections to prevent pieces of broken pipe, grout or other debris

from falling into the main line. All service line connections shall be of sufficient strength to withstand all handling and load stresses normally encountered in sewer installation and backfill work. Connections shall not project or protrude more than one-quarter (1/4) inch inside of the inside surface of the sewer main line. Connections which are not used shall be sealed with a cap or plug, a mechanical stopper approved in writing by the City Engineer or an integrally cast knockout plug.

Field installed 'Y' connections for sanitary sewer service lines and storm drain lines shall be allowed only by written permission of the City Engineer.

Field installed 'Tees' shall be allowed for storm drain service lines or inlet boxes only by written permission of the City Engineer. Field installed 'Tees' for sanitary sewer service lines shall be installed by cutting the main line to the same size as the service line, using a core drill or saw for all sizes of main line. For main lines of fifteen (15) inches or less, the pipe shall be excavated completely and a saddle type tapping hub with stainless steel bands shall be installed. For main lines greater than fifteen (15) inches, the pipe shall NOT be excavated below the area to be tapped and a cast iron tapping hub shall be non-shrink grouted in place.

705.08.1 - Reconnecting Service Lines

When "Reconnect Service Line" is specified, the existing service line is to be disconnected from the old main line and reconnected to the new main line. Service line reconnections shall meet all the requirements set forth herein for new service lines. The Contractor shall plan and coordinate his work with that of the sewer utility and the property owner, so that sewer service can be resumed with the least possible inconvenience to the public.

705.08.2 - Excavation and Backfill for Service Lines

When requested by the City Engineer, the Contractor shall open service line trenches to such depths as may be necessary to extend the new service line(s) from the main to ten (10) feet beyond the right-of-way line.

Excavation and backfill of service line trenches for sewer service connections shall be considered to be the same as that specified for main line trenches. When plastic pipe is used, the Contractor shall furnish and place SPECIAL PIPE ZONE MATERIAL for bedding and backfill in the PIPE ZONE. Such material shall be installed according to the Section on Backfill for Plastic or Copper Pipe in the Specifications for Trench Excavation and Backfill.

If service line is to be plugged for future use, a two by four (2 x 4) inch wood post shall be placed at this plug and the post shall extend approximately three (3) feet above the existing ground line.

705.09 - Abandonment or Removal of Existing Sewer Lines

When abandonment or removal of existing sewer lines is required, the Contractor shall not remove the old pipe until all service connections have been transferred to the new main. The Contractor shall make adequate provisions during construction for the care and protection of mains or services in use.

706 - LIFT STATION

This item shall consist of the Contractor furnishing and installing a lift station (either for sanitary or storm application) in accordance with these Specifications, Standard Drawings and Special Provisions at locations and in close conformity with the lines and grades shown on the Plans or as directed by the City Engineer. Those items, which are supplied by a manufacturer, shall have specifications and shop drawings submitted to the City Engineer for approval prior to the ordering of the material.

Excavation and backfill for installation of the lift station shall conform to the Standard Specifications. Excavation and backfill for the installation of pipe, conduit, and any other trench work shall conform to the Standard Specifications for Trench Excavation and Backfill. Pressure pipe shall conform to and be tested in accordance with the Standard Specifications for Water Lines.

706.01 - Materials

706.01.1 - Lift Station Structure

Unless otherwise approved by the City Engineer, the lift station structure shall be constructed from precast concrete eight (8) foot diameter barrel sections meeting the requirements of ASTM C 478 and a reinforced concrete floor with number five (5) rebar on six (6) inch centers placed in both directions. The flat concrete lid shall have a thirty (30) inch by forty-eight (48) inch hinged metal access cover with upper guide brackets, chain hooks, lid support, and horizontal bar for attachment of the liquid level sensor cables. The access cover shall meet the loading requirements shown on the Plans. However, any cover in vehicular traffic areas shall meet or exceed HS-25 loading requirements. The Contractor may pour the structure in-place with written permission of the City Engineer. The Contractor shall pay any costs for structural engineering for a poured-in-place structure.

Prior to ordering lift station appurtenances the Contractor shall submit to the City Engineer, for review and approval, a listing of all lift station appurtenances. Such request shall contain sufficient information to allow evaluation and approval of the appurtenances prior to ordering.

706.01.2 - Pressure Pipe, Vent Pipe and Conduits

Pressure pipe shall be four (4) inch minimum as required by size of pumps. The pressure pipe shall be ductile iron inside the lift station and over to and through the valve vault. The pressure pipe downstream from the valve vault may be PVC pipe if design conditions permit. Ball check valves, if required, shall be a FLYGT HDL TYPE 5087 or approved equal. Vent pipe shall be four (4) inch galvanized rigid steel pipe with threaded fittings. The above ground end of the vent pipe shall have a threaded collar with a welded one-eighth (1/8) inch screen

covering the opening. Electrical conduits shall be galvanized rigid steel meeting the requirements of NEC and of the size required for the conductor or as shown in the Standard Drawings whichever is larger.

706.01.3 - Submersible Pumps

The pumps shall be two (2) submersible Neva-Clog Flygt or Hydromatic wastewater pumps or approved equal.

The pumps shall be equipped with the required size electric motor connected for operation on a 240 volt, three (3) phase, sixty (60) hertz, four (4) wire service with a minimum of thirty-five (35) feet of Type SPC cable suitable for submersible pump applications or as approved by the City Engineer. The power cable shall be sized according to NEC and ICEA Standards and have a P-MSHA approval. The power cable shall be connected from the pumps directly to the control panel. Each pump shall be furnished with a minimum of twenty-five (25) feet of stainless steel lifting chain of adequate strength to safely raise and lower the pump with two (2) galvanized or stainless steel lifting rails and with mounting hardware and stainless steel bolts to fit the pumps and bases to the lift station as shown on the Standard Drawings.

706.01.4 - Pump Controls

The pump control panel shall be in a minimum 36" X 30" X 12" NEMA Type 4 gasketed, watertight, dust tight, lockable enclosure. The power supply shall be 240 volts, three (3) phase, sixty (60) hertz, four (4) wire service. All electrical equipment shall be U.L. listed. The panel shall include:

1. An intrinsically safe solid state alternator for two pumps which provides alternating operation of pumps under normal conditions and provides simultaneous operation of both pumps in case of high level conditions.
2. Condensation heater.
3. Lightning arrestor.
4. Adapter for direct connection of auxiliary power supply. City of Idaho Falls Standard = Appleton Cat. #ADJA6044150RS 60A 4W 4P STY. 1 or as required with a male end inside the receptacle. This adapter shall also include a transfer switch.
5. Each pump motor control shall include:
 - a. Running time meter
 - b. Pump run light.
 - c. A combination circuit breaker/overload with manual reset for protection against current overloads, short-circuit protection and disconnect for all phases.

- d. Across-the-line magnetic contactor.
- e. Hand/off/auto pump operations selector switch.
- f. Amperage meters with interior panel door display, sized appropriately based on the individual pump motor.

Pumps shall be controlled by a liquid pressure transducer mounted in the lift station manhole, communication cable, and control unit(s). All equipment shall be compatible with the lift station pump control and designed for the site conditions. The control unit shall be installed in a lockable weather resistant enclosure mounted on the Lift Station Control Pedestal a minimum of thirty (30) inches above the Lift Station lid. The control system shall be designed for a duplex pump system capable of insuring that the lead pump changes with each "pump on" event. The control unit shall allow the operator to control pump operation from the unit mounted on the Lift Station Pedestal with a liquid level selection range between zero (0) and thirty (30) feet. All equipment shall be installed in accordance with manufacturer recommendations. The control unit shall control pump and alarm operation at the following operator selected liquid level elevations that occur in the Lift Station Manhole:

- 1. Pump off (Minimum liquid level)
- 2. Lead Pump On
- 3. Lag Pump On
- 4. Alarm On

THE CITY SEWER DEPARTMENT SHALL PROVIDE A CONTROL LEVEL SETTING FOR EACH LIQUID LEVEL LISTED ABOVE PRIOR TO THE STARTUP OF THE LIFT STATION.

All electrical conduit openings that penetrate the lift station wall shall have seal-offs, NEMA approved for Class I Division I locations.

706.02 - Construction

706.02.1 - Submersible Pumps and Controls

All equipment shall be installed in a neat, plumb and workmanlike manner in accordance with the manufacturer's recommendations. The level transducer shall be mounted on the lift station wall in accordance with the manufacturer recommendations and in a location that minimizes false liquid level readings.

706.02.2 - Electrical Work

All electrical work shall be done in accordance with the Plans, these Specifications, all local City and State electrical codes, and the National Electric Code (NEC) by licensed electricians. An electrical installation permit shall be obtained from the City prior to starting construction.

706.02.3 - Electrical Service

The Contractor shall install conduit and wire from the meter base at the lift station control panel to the power supply as shown on the Plans or as directed by Idaho Falls Power representatives. All new lift stations shall be inspected by the City Building Department. The Contractor shall arrange for this inspection upon completion of the lift station installation. Any fees not waived by the Building Department shall be the responsibility of the Contractor and no additional compensation shall be made.

706.02.4 - Alarm Systems

For storm lift stations, an alarm light shall be installed on the outside of the control panel. The Contractor shall connect the high-level alarm sensor cable from the lift station to the control panel. The Contractor shall notify the City's Sewer Department when the alarm system work is completed to verify that the alarm system is functioning properly. Sanitary sewer lift station alarms shall be accommodated through the telemetry system.

706.02.5 - Pressure Discharge Pipe

Pressure discharge pipe shall be installed to gravity drain to the discharge manhole if possible. The Contractor shall install the pipe at an elevation so the top of the pressure discharge pipe and the top of gravity pipe in the discharge manhole are level and shall direct the outflow of the pressure discharge pipe at the invert. The ball check valves shall be located as shown on the Standard Drawings. The isolation valves shall be located as shown on the Standard Drawings. Pressure discharge pipe shall be Ductile Iron inside the lift station and over to and through the outlet manhole. Pressure pipe downstream from the outlet manhole may be PVC pipe if design conditions permit. All pressure pipe shall be tested in accordance with the City of Idaho Falls Standard Specifications for Water Lines.

Direct tapping of PVC pressure lines shall be completed as per Uni-B-8 specifications. PVC pressure lines shall also have tracing wire installed in the trench to facilitate future underground locations. Tracing wire ends shall be pulled from the valve vault manhole to the discharge manhole.

706.02.6 - Conduits

Conduits shall be installed in sand bedding as shown on the Standard Drawings. Conduits shall be blown free of any loose debris or moisture prior to pulling of any wire and shall be sealed thereafter.

706.03 - Start-up and Training

Upon completion of the construction, the Contractor shall notify the City of the time and date for initial start-up of the Lift Station. The Contractor shall

complete a minimum four (4) hour test period, provide up to eight (8) hours of operation training for City Sewer Department personnel, if required, and provide six (6) copies of an approved Operation and Maintenance Manual for the Lift Station to the City prior to acceptance.

707 - STORM DRAINAGE POND

Storm drainage ponds shall be constructed and designed as directed by the City Engineer and in accordance with the following criteria:

1. The volume of pond shall equal one-point-three (1.3) inches of water multiplied by the entire contributing area that flows to the pond. All ponds shall have a positive outlet or be sized at least ten (10) times greater than the required volume.
2. The pond outlet shall be designed to drain the entire pond in not more than seventy-two (72) hours.
3. All ponds shall have a minimum fifteen (15) foot wide asphalt access road and a minimum asphalt area of twenty (20) feet by twenty (20) feet at any lift station. Asphalt shall be two (2) inches thick over six (6) inches of three-quarter (3/4) inch crushed gravel base. The lift station and appurtenances shall be placed to allow clear access to the pond with trucks, mowers, etc.
4. The pond must have a minimum ten (10) foot wide horizontal (flat) area around the total top perimeter of the pond.
5. The sides of the pond shall have a maximum slope of four (4) feet horizontal to one (1) foot vertical (4:1), although a 5:1 slope is preferred.
6. Pond inlets shall have a properly designed energy dissipater that eliminates erosion. If riprap is utilized as the energy dissipater a concrete alley curb shall be poured around the riprap to facilitate a mowing edge. Pond inlets shall be constructed so that they are accessible for maintenance purposes.
7. Pond outlets shall be located the greatest distance possible from the inlet.
8. The bottom of the pond shall be sloped to a City Standard French Drain Manhole. The French Drain Manhole shall be located adjacent to the outlet of the pond or if there is no outlet the French Drain Manhole shall be the greatest distance from the inlet to the pond that is possible.
9. Topsoil shall be minimally compacted over the top surface area, to a minimum depth of six (6) inches.

10. The pond area shall have a sprinkler system meeting the requirements of the City of Idaho Falls Standard Specification and Drawings and approved by the City of Idaho Falls Parks Department. All soil areas shall be seeded with approved grass seed.
11. Pond inlet pipe shall not be designed to enter the pond at elevations below the lowest pond elevation, unless said line enters directly into a French Drain Manhole.

709 - MEASUREMENT AND PAYMENT

Trench excavation and backfill will be measured and paid separately under its respective bid item(s) under the Specifications for Trench Excavation and Backfill. The removal and replacement of concrete curb and gutter, concrete sidewalk, and street surfacing will be measured and paid under their respective bid item(s) under the Specifications for Portland Cement Concrete and the Specifications for Surface Courses and Pavement. However, if no bid item is in the Contract, payment for these items shall be part of the bid item for which they were performed and no additional compensation shall be awarded.

709.01 - Bypass Pumping

709.01.1 - Measurement

Bypass Pumping of raw wastewater during construction shall be measured on a LUMP SUM basis complete as stated in these Specifications.

709.01.2 - Payment

Bypass Pumping of raw wastewater shall be paid at the Contract unit price bid on a LUMP SUM basis. This lump sum payment shall be full compensation for furnishing all labor, materials, equipment, pumping costs, Contractor responsibility and all other items required for a complete and workable bypass pumping operation that is required, regardless of level of effort required, length of time, delays for construction, weather or other circumstances.

709.02 - Pipe

709.02.1 - Measurement

The various types, classes and sizes of Pipe shall be measured on a LINEAR FOOT basis along the center of the pipe through and including all tees, connections, fittings, etc. Measurement shall be from inside face to inside face of such related structures as manholes, catch basins, inlet boxes, drop inlet structures, etc. to which the Pipe may connect.

709.02.2 - Payment

The various sizes of Pipe shall be paid at the Contract unit price bid on a LINEAR FOOT basis to the nearest foot. If a specific type or class of Pipe is required under the Contract, it shall be paid at the Contract unit price bid on a LINEAR FOOT basis to the nearest foot. The payment shall be full compensation for all labor, equipment, materials, tools, and any other miscellaneous apparatus necessary for furnishing and installing the Pipe complete and in place including rubber gaskets, making any necessary connections to either new or existing pipe, manholes, or other structures, either air testing or water testing, dewatering

the trench, special pipe zone material, and any and all other work needed to complete the installation of the Pipe.

The cost of furnishing and placing special bedding material as required for plastic pipe shall be included in the unit price bid for the Pipe and no separate payment thereof shall be made.

Payment for other appurtenances not mentioned, such as tees, caps, plugs, or other fittings shall be considered as incidental to the cost of construction, and no additional compensation shall be allowed for providing and installing these appurtenances.

709.03 - Manhole

709.03.1 - Measurement

The various types of Manholes shall be measured on a PER EACH basis with an additional measurement for Manholes, except French Drain Manholes, having a depth greater than the standard six (6) foot depth established for all precast and drop manholes on a LINEAR FOOT basis. The Manhole depths shall be measured to the nearest foot vertically from the lowest invert at the center of the Manhole to the top of the Manhole ring and cover.

709.03.2 - Payment for Manhole

The various types of Manholes shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for furnishing and installing the Manhole structure complete and in place (including ring and cover) connected to the required sewer and/or drain pipe and including the necessary excavation, the gravel bedding or other required foundation materials, the backfill, and compaction around the Manholes, the concrete ring around the frame, or any other items of work or material necessary to complete the installation. No separate payment shall be made for final adjustment of the cover castings for new construction and all costs thereof shall be considered as incidental.

709.03.3 - Payment for Additional Manhole Depth

Manholes, except French Drain Manholes, having a depth in excess of six (6) foot shall be paid at the Contract unit price bid on a vertical LINEAR FOOT basis for the additional depth over the six (6) foot standard to the nearest foot. The payment shall be full compensation for furnishing and installing the additional manhole depth including the necessary excavation, backfill and compaction around the manhole.

709.03.4 - Payment for French Drain Manhole

French Drain Manhole shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install the French Drain Manhole complete and in place as shown on the Standard Drawings, Plans or as directed by the City Engineer.

There shall be no separate payment for structure excavation and structure backfill, precast concrete French Drain Manhole structure, coarse rock material, plastic sheeting, and any other required items. These items shall be incidental to and included in the per each cost of the French Drain Manhole.

709.03.5 - Payment for Drop Manhole Connection

The various sizes of Drop Manhole Connection shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to furnish and install the Drop Manhole Connection complete and in place as shown on the Standard Drawings, Plans or as directed by the City Engineer. There shall be no separate payment for the excavation and backfill, pipe, and non-shrink concrete used for this Drop Manhole Connection. These items shall either be covered under their respective bid items or shall be incidental to and included in the cost of other bid items.

709.04 - Inlet Box

709.04.1 - Measurement

The various types of Inlet Box, drop inlet structure, etc. shall be measured on a PER EACH basis with an additional measurement for Inlet Box having a depth greater than the standard three and one-half (3-1/2) foot depth established for all precast and cast-in-place Inlet Boxes on a LINEAR FOOT basis. The Inlet Box depth shall be measured to the nearest foot vertically from the lowest invert at the center of the inlet box to the top of the Inlet Box frame and grate.

709.04.2 - Payment for Inlet Box

The various types of Inlet Box, drop inlet structure, etc. shall be paid at the Contract unit price bid on a PER EACH basis. The payment shall be full compensation for furnishing and installing the Inlet Box structure complete and in place (including ring and/or frame and cover and/or grate) connected to the required drain pipe and including the excavation, gravel bedding and/or foundation material, backfill, and any other work or materials necessary to complete the installation.

709.04.3 - Payment for Additional Inlet Box Depth

Inlet box having a depth in excess of three and one-half (3-1/2) foot shall be paid at the Contract unit price bid on a vertical LINEAR FOOT basis for the additional depth over the three and one-half (3-1/2) foot standard to the nearest foot. The payment shall be full compensation for furnishing and installing the additional inlet box depth including the necessary excavation, backfill and compaction around the inlet box.

709.05 - Service Line and Connection

709.05.1 - Measurement

Pipe for the various sizes of service line shall be measured on a LINEAR FOOT basis along the center of the pipe with the measurement being from the outside surface of the main sewer through and including all tees, "Y's", bends, or other fittings or connections to the extreme end of the last piece of pipe or fitting placed.

Service Line Connection shall be measured on a PER EACH basis for the various sizes of service line installed.

709.05.2 - Payment for Service Line

The various sizes, types and classes of service line pipe shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be full compensation for all labor, equipment, materials, tools and any other miscellaneous apparatus necessary for furnishing and installing the pipe complete and in place including rubber gaskets, either air testing or water testing, and any other appurtenances such as tees, caps, plugs or other fittings needed to complete the installation of the pipe. No separate payment shall be made for SPECIAL PIPE ZONE MATERIAL for plastic pipe and the cost shall be included in the unit bid price for the pipe.

709.05.3 - Payment for Service Connection

Connection for service line shall be paid at the Contract unit price bid on a PER EACH basis for the various sizes of the service line specified. The payment shall be full compensation for all labor, equipment and materials as may be required to satisfactorily complete the connection of the service line as specified. There shall be no separate payment for any hub, saddle type tap, bend, plug, etc. that may be utilized and required for the installation of the Service Line Connection.

709.05.4 - Payment for Reconnecting Service Line

Reconnecting Service Line shall be paid at the Contract unit price bid on a PER EACH basis for the various sizes of the service line specified. The payment

shall be full compensation for all labor, equipment and materials as may be required to satisfactorily complete the reconnection of the service line as specified. There shall be no separate payment for any pipe or appurtenances such as hubs, saddle type taps, bends, plugs, etc. that may be utilized and required for the installation of the service line connection. No separate payment shall be made for SPECIAL PIPE ZONE MATERIAL for plastic pipe and the cost shall be included in the unit bid price per connection.

709.06 - Removal of Sewer Line and Appurtenances

Where sewer line is shown to be removed in the Plans or must be removed to install the new sewer line and there is no separate bid item for sewer line removal, then the sewer line and associated appurtenances shall be removed as shown, as is necessary for installation of the new line, and as directed by the City Engineer. The cost of the removal shall be included in other bid items.

709.06.1 - Measurement

Removal of Sewer Line shall be measured on a LINEAR FOOT basis along the centerline of the trench for the pipe.

Removal of Sewer Line Appurtenances and fittings, such as manhole, inlet box and etc., shall be measured on a PER EACH basis for the specified appurtenance or fittings. Where no separate bid item is provided for the removal of specific appurtenances or fittings, such appurtenances or fittings shall be included in the linear footage measured for the pipe attached thereto.

709.06.2 - Payment

Removal of Sewer Line shall be paid at the Contract unit price bid by the LINEAR FOOT for the size specified.

All appurtenances shall be paid at the Contract unit price bid on a PER EACH basis. Where no separate bid item is provided for the removal of specific fittings or appurtenances, the cost of the removal shall be included in the unit price bid for the removal of the sewer line attached thereto.

709.07 - Lift Station

709.07.1 - Measurement

The various types (sanitary or storm) of Lift Station shall be measured on a LUMP SUM basis complete, in place, and fully operational as stated in these Specifications.

709.07.2 - Payment

The various types (sanitary or storm) of Lift Station shall be paid at the Contract unit price bid on a LUMP SUM basis. The payment shall be full compensation for all labor, tools, materials, equipment and tools necessary to furnish, install, test and make ready for service the Lift Station complete and in place as shown on the Standard Drawings, Plans and as directed by the City Engineer.

There shall be no separate payment for structure excavation and structure backfill, precast concrete manhole, Lift Station wet well, pipe, discharge pipe and fittings, trench excavation and backfill, submersible pumps and controls, and any other required items. These items shall be included in the lump sum cost of the Lift Station.

709.08 - Energy Dissipator

709.08.1 - Measurement

Energy Dissipator shall be measured on a LUMP SUM basis complete, in place, as shown in the Standard Drawings and as indicated in these Specifications.

709.08.2 - Payment

Energy Dissipator shall be paid at the Contract unit price bid on a LUMP SUM basis. The payment shall be full compensation for all labor, tools, materials, equipment and tools necessary to construct Energy Dissipator complete and in place as shown on the Standard Drawings and as directed by the City Engineer.

There shall be no separate payment for excavation, geotextile, concrete curb, pipe grate (if required) and riprap. This work shall be considered part of the Contract unit price bid for Energy Dissipator.

**CITY OF IDAHO FALLS
PUBLIC WORKS DIVISION
ENGINEERING DEPARTMENT**

**STANDARD SPECIFICATIONS FOR
TRENCH EXCAVATION AND
BACKFILL
SECTION 800**

2010 EDITION

**STANDARD SPECIFICATIONS FOR TRENCH
EXCAVATION AND BACKFILL
2010 EDITION
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TRENCH EXCAVATION AND BACKFILL

SECTION 800

800 - INTRODUCTION

These Specifications cover the excavation and backfill operations normally used for the installation of underground utility systems. All materials, workmanship and installation of underground utility systems shall be done in accordance with these Standard Specifications, the Plans and Special Provisions or as directed by the City Engineer. Any installation not conforming to the requirements shall be removed and replaced or repaired to the satisfaction of the City Engineer at the Contractor's expense. No work will be considered for acceptance until such repair or replacement is accomplished.

The Contractor shall immediately submit written notice to the City Engineer of changes in Site Conditions, such as additional trench depth and/or width, bedding conditions and combinations thereof that may require a higher class or type of pipe than that specified. Additional compensation shall not be awarded for any extra work resulting from such changed conditions unless prior to performing such extra work the Contractor shall have submitted written notice of the changed conditions to the City Engineer and the City Engineer shall have given written authorization of the extra work. If such changed conditions are for the convenience of the Contractor's operations, any and all additional costs associated therewith shall be at the expense of the Contractor. It is not intended that materials listed herein are to be considered equal or generally interchangeable for all applications. The City Engineer shall determine which materials are suitable for the Project and shall specify those materials in the Plans and/or Special Provisions.

A trench is defined as an excavation in which the depth is greater than the width of the bottom of the excavation. Excavations for appurtenant structures, such as but not limited to manholes, transition structures, junction structures, vaults, valve boxes, inlet boxes, thrust blocks and boring pits shall be deemed to be in the category of trench excavation. All trenches shall be backfilled using Class 'A' backfill as defined in Subsection 805.09 or as designated by the City Engineer.

Prior to any excavation work, the Contractor shall notify all utility companies of the proposed excavation and request said companies stake or mark the location of their underground lines. Any locations for underground utilities shown on plans shall not relieve the Contractor of his responsibility to verify the locations with the respective utility companies.

Excavation shall include the removal of all water and materials of any nature that interfere with the construction work. Removal of ground water to a level below the structure subgrade will be necessary only when required by the City Engineer. Excavation for conduits shall be by open trench or as designated by the City Engineer. However, should the Contractor elect to tunnel or jack any portion not so specified, he shall first obtain written approval from the City Engineer. Payment for such work will be made as though the specified methods of construction had been used.

801 - MATERIALS

801.01 - Classified Excavation

Classified Excavation shall be defined as all material, which can be removed with standard trenching equipment, does not require systematic drilling and blasting or other methods and is suitable for use as backfill material in the excavated trench. All excavation shall be Classified Excavation unless otherwise designated by the City Engineer.

Classifications for trench excavation shall be determined as follows:

Class I	0 to 6 feet
Class II	6.01 to 8.00 feet
Class III	8.01 to 10.00 feet
Class IV	10.01 to 12.00 feet
Class V	12.01 to 14.00 feet
Class VI	14.01 to 16.00 feet
Class VII	16.01 feet and greater

801.02 - Unsuitable Material Excavation

Unsuitable Material Excavation shall be defined as all material which can be removed with standard trenching equipment, does not require systematic drilling and blasting and is NOT suitable for use as backfill material in the excavated trench. The City Engineer shall determine whether the material is suitable for backfill in the trench.

801.03 - Rock Excavation

Rock Excavation shall be defined as all material that requires systematic drilling and blasting or other methods for removal. The City Engineer shall determine whether the material in the trench will be classified as Rock Excavation. The term "rock" shall be understood to mean solid sandstone, limestone, granite, basalt or other solid material of similar hardness in ledges, bedded deposits or unstratified masses. "Rock" less than one (1) cubic yard in volume, cemented gravel (conglomerate), shale, clay and other sedimentary materials will not be classified as rock excavation unless in the City Engineer's opinion systematic drilling and blasting is required for removal. Loam, sand, gravel, clay or other such material stratified between the layers of rock will not be classified as rock excavation unless in the City Engineer's opinion such layers cannot be defined separately for quantity measurements.

Where directed by the City Engineer, the Contractor, at his own expense, shall remove all loam, sand, gravel, clay or other such material above the rock and clean off and expose the rock surface in a satisfactory manner so that the City Engineer may examine the surface and obtain any required measurements.

801.04 - Common Backfill Material

Common Backfill shall be clean sand, soil, gravel or any mixture approved by the City Engineer or combination thereof, reasonably free from organic material or debris. Granular borrow or crushed gravel shall be reasonably well graded from coarse to fine with a maximum diameter of six (6) inches. Primary use of this material shall be in and above the pipe zone.

801.05 - Base Stabilization Material

Base Stabilization Material shall be clean, granular borrow or crushed gravel, reasonably well graded from coarse to fine with a maximum diameter of two (2) inches. Primary use of this material shall be below the pipe or pipe zone.

801.06 - Select Backfill Material

Select Backfill Material shall consist of bank-run sand and gravel, aggregate, stone screenings or any mixture approved by the City Engineer or combination thereof, reasonably graded from coarse to fine with a maximum diameter of three-quarter (3/4) inch. The sand equivalent shall not be less than thirty (30). Primary use of this material shall be below the pipe through rock excavation.

801.07 - Special Pipe Zone Material

Special Pipe Zone Material shall consist of crushed gravel reasonably graded from coarse to fine with a maximum diameter of three-quarters (3/4) inch and meeting the requirements of Aggregate Base Course in the Standard Specifications. Primary use of this material shall be in the pipe zone as defined in Section 805 of the Standard Specifications and as shown in of the City of Idaho Falls Standard Drawings.

801.08 - Dewatering Material

Dewatering Material shall consist of clean crushed gravel with a maximum diameter of three-eighths (3/8) inch and meeting the requirements of Cover Coat Material in the Standard Specifications. Primary use of this material shall be below the pipe to a maximum depth of six (6) inches when water is encountered in this area during pipe installation work.

801.09 - Bentonite Soil Material

Bentonite Soil Material shall consist of a uniform mixture of eighty (80) percent parent soil and twenty (20) percent bentonite sealing clay. The Contractor shall submit a sample of or literature on the bentonite clay intended for use to the City Engineer for approval prior to the actual use of this material. Primary use of this material shall be for the trench seal used in repair of waterways.

801.10 - Water for Backfill

Water for trench backfill compaction will be available at no charge to the Contractor from fire hydrants on the City water system, but only by written permission of the Fire Department and by using an approved water conveyance system that has been checked and approved by the City Water Department. The Contractor shall provide and utilize an approved fire hydrant wrench and valve for obtaining water from fire hydrants. Any damage to fire hydrants used by the Contractor shall be repaired at no cost to the City. It will be the Contractor's responsibility to make all necessary arrangements for supply and delivery of water to the trench.

801.11 - Pumice for Insulation

Pumice for insulation shall be a course grade consisting of one-half (1/2) inch to No. 4 in size per ASTM C 332 (Course Aggregate) and shall be free from dust and harmful material. Primary use of this material shall be from bottom of pipe area to twenty-four (24) inches above the pipe, but only when required depth of line cannot be obtained under certain conditions.

801.12 - Filter Fabric used in Pumice for Insulation

Filter fabric used in pumice for insulation shall meet the requirements of "Geotextile Fabric" in the Standard Specifications. Four (4) inches minimum rigid board closed-cell polystyrofoam insulation shall be placed over the pumice. Refer to the Standard Drawings for placement of pumice and insulating board.

805 - CONSTRUCTION

It is the intent of these Specifications that the work progresses in a systematic manner so that as little inconvenience as possible will result to the public during the course of construction. It is, therefore, necessary that the Contractor confine his operations to as small a length of work per crew as feasible. There shall be no more than four-hundred (400) feet of open trench at any given time per pipe laying operation, except when the distance between control valves or manholes is greater than four-hundred (400) feet. Complete backfill and clean up shall be accomplished within forty-eight (48) hours after the inspection and approval of each section of pipe, except by written permission of the City Engineer.

The PIPE ZONE for plastic or copper pipe shall be considered to include the full width of the excavated trench from a point six (6) inches below the bottom of the pipe to a point twelve (12) inches above the top of the pipe. The PIPE ZONE for all other types of pipe shall be defined as the area of the trench from the bottom of the pipe to a point twelve (12) inches above the top of the pipe and for the full width of the trench unless otherwise specified herein.

The Springline shall be defined as a horizontal plane of the transverse cross-section of a pipe, located at the mid point of the pipe.

Pipe structures shall be Manholes, Inlet Boxes, Headwalls, and any other appurtenances installed in conjunction with the associated pipe installation.

805.01 - Construction within Easements

When the trench is to be excavated within an easement, the Contractor shall acquaint himself with the requirements of the easement, shall confine his operations to the area within the easement and shall obtain from the easement grantor at the completion of the construction a written release indicating that the work has been satisfactorily completed in accordance with the terms of the easement. Should it be found impossible for the Contractor to obtain the required written release(s), either because of the absence of the grantor or because of impractical demands by the grantor, then the City Engineer may waive this requirement if it is determined that the Contractor has fulfilled his obligation. The Contractor shall notify the owner(s) of any so affected properties forty-eight (48) hours in advance of the time when construction work will be started within the easement.

805.02 - Public Safety and Access

During all construction operations, the Contractor, at his expense, shall construct and maintain such facilities as may be required to provide access for all property owners to their property. No person shall be denied access to his residence or place of business for a period exceeding eight (8) hours unless the

Contractor has made a special arrangement with the so affected person covering his loss of access. Where private accesses are to be closed, the property owner shall be notified by the Contractor at least forty-eight (48) hours in advance of closure.

Access for fire and emergency equipment for the protection of buildings, life and property shall be maintained at all times. Unobstructed access shall be provided to all fire hydrants, water valves and meters and clearance shall be left to enable free flow of storm water in all gutters, pipe and natural watercourses.

805.02.1 - Streets and Driveways

The Contractor shall promptly reopen streets, roads and driveways to the public after the utility has been installed past these points. Unless otherwise approved by the City Engineer, no traffic way shall be closed while work is suspended over weekends or holidays and closure during workdays shall be as brief as practicable. The work shall be carried on so as to cause a minimum of disruption of normal commercial pursuits. Traffic must be kept open on those roads and streets where no detour is possible.

The Contractor shall obey all rules, laws, ordinances and regulations of the State, County and City authorities as to the closing and barricading of public roads and streets. All such barricading and signing shall be in accordance with the current edition of the Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways, published by the U.S. Department of Transportation, Federal Highway Administration. The erection and removal of traffic control devices shall be approved by the City Engineer.

The Contractor shall, without further or other order, provide, direct and maintain at all times during the progress or temporary suspension of work, suitable barricades, fences, signs or other adequate protection and shall provide, keep and maintain such danger lights, signals, and flagmen as may be necessary to ensure the safety of the public as well as those in any other way associated with the work. All barricades and obstructions shall be protected by signal lights which shall be suitably distributed across and along the roadway and which shall be kept operating from one (1) hour before sunset until one (1) hour after sunrise and at such other times as vision is obscured by fog, smoke, or dust.

805.02.2 - Temporary Pedestrian Crossings

The Contractor, at his expense, shall provide all necessary temporary pedestrian crossings for the proper handling of pedestrian traffic over the trench and shall provide access to private property where required by the City Engineer.

805.03 - Protection of Property

All existing structures encountered within the course of construction shall be protected and not damaged insofar as possible unless the Plans call for the abandonment of said structure(s). Any damage to existing structures that, in the opinion of the City Engineer, could have been prevented by the Contractor shall be repaired at the expense of the Contractor to a condition equivalent to the original condition of the structure. Upon notice, the owners of the various known underground utilities will stake out such utilities that are in the path of the construction operation. Any damage done to these staked out utilities by the Contractor shall be repaired or replaced at the Contractor's expense and he will be charged for labor and materials to repair the damaged utility line.

805.03.1 - Irrigation Channels

Construction operations through irrigated lands shall be scheduled during the nonirrigation season. However, construction may proceed during the irrigation season, provided that the Contractor constructs, at his own expense, such temporary irrigation ditches, turn outs or other miscellaneous structures or facilities as may be required, so that the lands can be irrigated by others during the construction work.

The irrigation channels are normally not used during the period of November 1 to April 1. The Contractor shall be responsible to contact the appropriate irrigation company and schedule his work to minimize any conflicts. Additional compensation requested by the Contractor due to schedule changes as a result of irrigation company requests shall not be allowed. Additional compensation will be considered should the City Engineer determine that irrigation company requests prevent the Contractor from performing the work within the specified contract time using established construction practices.

Following the final backfilling and compaction of the trench(es), the Contractor shall restore all irrigated fields and all irrigation channels that may have been destroyed, damaged or otherwise modified during the course of construction to a condition equivalent to or better than the original condition of the irrigation channel or irrigated field before the construction work commenced. Channels so reconstructed shall be built in their original location unless otherwise called for on the Plans or as approved by the City Engineer.

805.03.2 - Fences and Miscellaneous Structures

The Contractor shall move all fences crossing the trench and/or those parallel with the trench where necessary to allow for proper trench excavation and pipe installation. During construction operations in farmlands, temporary fences shall be installed by the Contractor to confine livestock within their proper areas and to allow livestock full access to water and pasture lands. Following backfill and clean-up, the fences shall be restored to their original location and

condition using either the existing materials or other new or used materials of equal or better type and condition, so that the restored fence is equal or better in all respects and conditions to the original fence.

Miscellaneous small outbuildings and other movable structures located on or so near to the trench as to be endangered by the trench excavation work and which are not designated to be moved by others, shall be moved by the Contractor to the location designated by the property owner; provided, however, that the Contractor will not be required to move such miscellaneous structures more than fifty (50) feet.

805.04 - Clearing

At locations where, in the opinion of the City Engineer, clearing of the right-of-way is necessary, the Contractor shall remove brush, stumps, large vegetation and refuse so as to leave the area clean and unobstructed for the work that follows. Extreme care shall be exercised to protect all trees, farm crops, fences and other improvements and materials on private property bordering the right-of-way from damage. Brush, trees and combustible refuse removed during clearing operations shall be disposed of in a manner approved by the City Engineer.

805.04.1 - Removal of Landscaped Areas

When excavation and backfill is required where lawn sod, shrubs, topsoil and other items must be removed and/or replaced, the Contractor shall first notify the affected property owner(s) of the impending construction work. The Contractor shall carefully remove all shrubs and other above ground items. The Contractor shall carefully cut and remove all lawn sod and remove the topsoil to a depth of at least six (6) inches or the depth of the actual topsoil if less than six (6) inches. The width of the lawn sod and topsoil removal shall be at least one (1) foot wider on each side of the excavated trench width. The topsoil material shall be piled separately from and shall not be mixed with the remainder of the excavated material.

805.04.2 - Removal of Asphalt Surfacing

Prior to excavating any trench in areas where asphalt surfacing exists, the Contractor shall cut the asphalt surfacing to a width necessary to accomplish the trenching operations to the specified trench depths. Failure to comply with this requirement shall be just cause to reject any or all work and the Contractor shall remove all asphalt surfacing adjacent to the trenching operations to a width specified by the City Engineer. Exceptions shall be by written permission of the City Engineer and the terms of full pavement restoration shall be stipulated therein and agreed upon by the Contractor, prior to the commencement of any or all such trenching operations.

The Contractor shall saw cut all existing asphalt pavement which will have new **full depth** asphalt plantmix pavement placed against it. The Contractor may initially cut the asphalt a minimum of one (1) foot from the final saw cut line using any method, which does not damage or disturb the asphalt at the final saw cut line. The final cut shall be made just prior to the start of paving operations and the Contractor shall protect the edge until the completion of the paving. Any costs associated with this work shall be considered incidental and its cost shall be included in other bid items.

805.05 - Excavation

The Contractor shall perform all excavation of every description and of whatsoever substance encountered to the depth indicated on the Plans or specified herein. The Contractor shall be solely responsible for the safety of personnel in below grade excavations. The slope of the trench banks and sidewalls shall be constructed within the guidelines of the Occupational Safety and Health Act (OSHA) requirements for trench safety. Where required to control the trench width or to protect adjacent structures, the trench shall be properly sheeted and braced. All grading and other excavations nearby shall be controlled to prevent surface water from flowing into the excavated trench.

The Contractor shall exercise sound engineering and construction practices in excavating the trench and maintaining it so that no damage will occur to any foundation, structure, pole line, pipe line or other facility because of sluffing of slopes, or from any other cause. If, as a result of the excavation, there is disturbance of the ground that endangers other property, the Contractor shall immediately take remedial action, at his own expense, to correct the problem. No act, representation or instruction of the City Engineer or his representatives shall in any way relieve the Contractor from liability for damages or costs that result from his trench excavation work or procedures.

805.05.1 - Access to Trenches

The Contractor shall provide safe access to all trenches or below ground excavations. As a minimum, the requirements of the Occupational Safety and Health Act (OSHA) shall be met.

805.05.2 - Trench Width

The minimum trench width shall be eighteen (18) inches, unless a method of compaction or special backfill is approved in writing by the City Engineer. The maximum trench width in the PIPE ZONE shall be as follows:

1. Pipe sizes of fifteen (15) inches in diameter and smaller shall have a maximum trench width of forty (40) inches.

2. Pipe sizes larger than fifteen (15) inches in diameter shall have a maximum trench width of one and one-half (1.5) times the diameter plus eighteen (18) inches.

If the maximum trench width is exceeded by the Contractor without prior written authorization of the City Engineer, the Contractor will be required at his own expense to provide pipe of higher strength classification or a higher class of bedding, as may be deemed necessary by the City Engineer. These maximum trench widths may require lateral support of the excavation walls to meet OSHA trench safety requirements. Any sheeting or temporary support system must meet the OSHA requirements and be designed and certified by a qualified professional engineer.

In all cases, trenches must be of sufficient width to permit proper jointing of the pipe and backfilling of material along the sides of the pipe. Trench width at the surface of the ground shall be kept to the minimum amount necessary to install the pipe in a safe manner.

Wherever a trench is excavated in paved roadway, sidewalk or other improved area, a vertical trench section, unless otherwise specified, with the maximum trench width at the surface of the ground not to exceed the width in the PIPE ZONE shall be required. If the Contractor exceeds this width, he shall be required to pay for any additional surface and subsurface improvements.

Excavation for manholes and other structures shall be sufficient to provide a minimum of twelve (12) inches between their surfaces and the sides of the excavation.

805.05.3 - Trench Depth

Minimum trench depth shall be twenty-four (24) inches to top of installed feature, unless otherwise approved by the City Engineer. Care shall be taken not to excavate below the trench depth indicated. Any excavation that is below the indicated depth shall be backfilled at the Contractor's expense with material approved by the City Engineer and compacted to ninety-five (95) percent of the maximum density as determined by AASHTO T 310.

805.05.4 - Excavated Material

All excavated and fill materials shall be piled no closer to the edge of the trench or excavation than allowed by OSHA requirements. It shall be piled in such manner as will cause a minimum of inconvenience to public travel and provision shall be made for merging traffic where such is necessary.

All excess excavated materials shall be hauled away and disposed of by the Contractor, at his expense, at waste sites approved by the City Engineer.

805.05.5 - Unsuitable Material Excavation

The City Engineer shall determine if any excavated material is unsuitable for use as backfill in the trench. However, unsuitable material resulting from rock excavation or unstable soil conditions under the pipe shall be covered under their respective Sections in these Specifications. The Contractor shall segregate any such designated material, insofar as practical using standard construction practices, from the material that is suitable for backfill. The Contractor shall haul and dispose of the segregated material at approved waste sites and furnish COMMON BACKFILL MATERIAL from an approved source, as replacement material in such quantity as may be required to backfill the trench.

805.06 - Rock Excavation

Where rock is encountered in the trench excavation work, it shall be drilled, blasted and excavated out to the required depth below the outside edge of the pipe as shown in the "ROCK EXCAVATION AND SELECT BACKFILL DIAGRAM" on the Standard Drawings. Unless otherwise directed by the City Engineer, rock excavation for Manholes, inlet boxes, etc., shall be limited to three (3) feet greater than the outside of the manhole and to one (1) foot below the bottom of the Manhole floor. The trench shall then be backfilled with SELECT BACKFILL MATERIAL and compacted to ninety-five (95) percent of the maximum density as determined by AASHTO T 310 to establish the proper elevation, grade and bedding of the pipe. The remainder of the trench above the flow line grade shall be backfilled in accordance with the PIPE ZONE BACKFILL and the particular backfill class specified.

805.06.1 - Blasting

Where blasting is necessary during rock excavation, extreme care shall be used. Signals of danger shall be given before the firing of any blast. The Contractor shall conform to all rules and regulations for the protection of lives and property that may be imposed by any public authority or that may be made by the City Engineer relative to the storing and handling of explosives and the loading and firing of blasts. The Contractor shall not use, store, transport or dispose of any explosives or blasting agents without first having obtained a permit for same from the City's Fire Department. No blasting shall be done at any time except by persons qualified in this line of work and conforming with all applicable laws and regulations and as approved in writing by the City Engineer.

The Contractor shall indemnify and hold harmless the City from any and all claims by any person or entity whatsoever arising from any act or conduct performed by the Contractor, his employees or agents in connection with any blasting activity. No act, representation or instruction of the City Engineer or his representatives shall in any way relieve the Contractor from liability for damage or costs that result from his blasting work or procedures.

No blasting shall be done adjacent to any portion of exposed work unless proper precautions are taken to ensure that such blasting shall not damage the work and material surrounding the same. In case damage from blasting occurs to any portion of the work or to the material surrounding or supporting the same, the Contractor, at his own expense, shall remove such damaged work, repair the work and replace the material surrounding or supporting the same to the satisfaction of the City Engineer.

805.06.2 - Disposal of Excavated Rock

All excavated rock shall be hauled away and disposed of by the Contractor to approved waste sites. In no case shall any rock that is six (6) inches in diameter or larger be used in the backfill of any trench. If the removal of excavated rock causes a deficiency in the amount of material available to complete the backfilling of any portion of the trench, the Contractor shall, at his own expense and from his own source, import COMMON BACKFILL MATERIAL in such quantity as may be required to complete the backfilling of the trench.

805.07 - Shoring, Sheeting and Bracing of Trenches

OSHA guidelines shall govern the requirement for sheeting or bracing of all excavations. Where sheeting and bracing are used, the trench width shall be increased accordingly to provide the required clear distance between the outside edge of the pipe and the sheeting. Trench sheeting shall remain in place until the pipe has been placed, tested for defects, repaired if necessary and backfill of the PIPE ZONE is completed.

805.08 - Pipe Zone Backfill

805.08.1 - Grading

The bottom of the trench shall be excavated and leveled to the lines and grades to which the pipe is to be laid, with proper allowances for pipe thickness and for special bedding when required. Each length of pipe shall be supported on undisturbed or compacted soil at every point along its entire length except at joints. Bell holes shall be excavated to the extent necessary to permit accurate work in making and inspecting the joints. Any part of the trench excavated below the approved grade shall be backfilled to the proper elevation with approved material and compacted to ninety-five (95) percent of the maximum density as determined by AASHTO T 310 to provide an adequate foundation for the pipe installation.

805.08.2 - Backfill for Unstable Soil Conditions

Where pipe is to be laid in a trench in fine sand, wet silt, wet clay or any other unstable material that will not provide a satisfactory base for the pipe, the trench shall be excavated below the established flow line grade of the pipe to the

depth designated by the City Engineer and then backfilled to the required grade with BASE STABILIZATION MATERIAL compacted to ninety-five (95) percent of the maximum density as determined by AASHTO T 310 to provide the proper elevation, grade and bedding for the pipe.

805.08.3 - Common Backfill

The maximum size of COMMON BACKFILL MATERIAL allowed in the PIPE ZONE shall be as depicted in the following table:

Pipe Size	Maximum Size
Less than Twelve (12) Inches	One (1) Inch
Twelve (12) to Thirty-Six (36) Inches	One (1) Inch per Foot of Pipe Diameter
Greater than thirty-six (36) inches	Three (3) inches

The common backfill material shall be placed in the trench simultaneously on both sides of the pipe for the full width of the trench in layers not exceeding six (6) inches in depth or one-half (1/2) the pipe diameter, whichever is less. The material shall be compacted to ninety-five (95) percent of the maximum density as determined by AASHTO T 310 using an impact or vibratory compactor with particular attention to the underside of the pipe and the fittings to provide solid backing against the external surface of the pipe.

805.08.4 - Backfill for Plastic and / or Copper Pipe

Backfill of the PIPE ZONE must receive particular attention and care to prevent damage to the pipe. The minimum depth of this SPECIAL PIPE ZONE MATERIAL under the pipe shall be six (6) inches. However, when installation is in areas of rock excavation, the depth of the special pipe zone material shall meet the requirements of the "ROCK EXCAVATION AND SELECT BACKFILL DIAGRAM" in the Standard Drawings. It shall be hand graded to provide the proper grade ahead of pipe laying operations and shall be thoroughly compacted to a density of at least ninety-five (95) percent of the maximum density as determined by AASHTO T 310 before the pipe is laid, so as to provide a firm, unyielding support along the entire pipe length. Impact or vibratory compactors shall not be used for compaction of the remaining backfill material within the PIPE ZONE; further, impact compactors shall not be used until three (3) feet of cover has been placed over the top of the pipe.

SPECIAL PIPE ZONE MATERIAL shall be imported for use in the PIPE ZONE of all plastic and copper pipe. This material shall be placed in a manner approved in writing by the City Engineer, simultaneously on both sides of the pipe for the full width of the trench in lifts not to exceed six (6) inches in depth.

However, the first lift shall not exceed the springline of the pipe. Each lift shall be “walked in” and supplemented by slicing with a shovel to ensure all voids around the pipe have been completely filled. Particular attention shall be given to the compaction in that area extending from the flow line to the springline of the pipe to ensure that firm support is obtained under and around the pipe to prevent excessive pipe deflection and to prevent any lateral movement of the pipe during the backfill operation.

805.09 - Class “A” Backfill

This backfill shall be used for all trenches unless otherwise approved by the City Engineer. The PIPE ZONE shall be backfilled in accordance with the Section on Pipe Zone Backfill in these Specifications.

The trench area from above the PIPE ZONE to one (1) foot below the existing or proposed roadway subgrade or the original ground line shall be backfilled and compacted in eight (8) inch lifts with each lift being approximately parallel to the pipe grade longitudinally and level to somewhat concave transversely. The moisture content of the backfill material for each lift shall be adjusted to within two (2) percent of the optimum moisture content and the backfill shall be compacted to ninety-five (95) percent of the maximum density as determined by AASHTO T 310.

The one (1) foot of trench area immediately below the existing or proposed roadway subgrade or the original ground line shall be compacted to one hundred (100) percent of the maximum density as determined by AASHTO T 310. This area of the trench shall be entirely free of any rocks or stones larger than three (3) inches in diameter.

805.10 - Pumice for Insulation

Pumice for insulation shall be installed to a depth of two (2) foot above the top of pipe in the area as shown on the Pipe Insulation Detail of the Standard Drawings vibrated into place to provide even consolidation in the pipe zone and then covered with four (4) inches of rigid board closed-cell polystyrofoam insulation and then covered with a filter fabric to prevent silt and fines from infiltrating into the pumice and polystyrofoam insulation. Backfill material of three-quarter (3/4) inch minus in size shall be placed to a depth of one (1) foot above the filter fabric before any mechanical compaction device is used.

805.11 - Replacing of Landscaped Areas

The trench area shall be backfilled to the topsoil elevation using maximum eight (8) inch lifts. Each lift of backfill shall be compacted to ninety (95) percent of the maximum density as determined by AASHTO T 310. The removed topsoil backfill material shall be evenly wetted and compacted to eighty-five to ninety (85-90) percent of the maximum density as determined by AASHTO T 310. The

Contractor shall then replace the lawn sod, shrubs and other items that may have been removed and shall clean up and remove any rocks, dirt or other debris that remain from the construction work. In lieu of removing and replacing the lawn sod, the Contractor may, with the agreement of the property owner, replant the lawn or pay the property owner to replant the lawn. This agreement shall be documented in the final letter of acceptance or release from the property owner(s).

Upon completion of the work, the Contractor shall secure a written release from all affected property owners indicating their acceptance of the work and a copy of said release shall be furnished to the City Engineer.

805.12 - Asphalt Plantmix Surfacing and Aggregate Base

The Contractor shall replace all removed asphalt plantmix surfacing and aggregate base material with a minimum depth six (6) inch layer of aggregate base material and a minimum depth two (2) inch layer of new asphalt plantmix surfacing. However, if either the existing asphalt plantmix surfacing or aggregate base material has a greater thickness than previously stated, the thickness of the new asphalt plantmix and aggregate base material shall be equal to the existing thickness of asphalt plantmix surfacing and aggregate base material, respectively. The replaced material shall be placed throughout the entire width and length of the trench and/or adjacent areas where it is necessary to remove any existing asphalt surface.

In those areas where the existing street section is being proposed to change to a commercial street section, any removed asphalt plantmix surfacing and aggregate base material shall be replaced with a minimum depth ten (10) inch layer of aggregate base material and a minimum depth four (4) inch layer of new large stone asphalt plantmix surfacing or as directed by the City Engineer.

All aggregate base material, asphalt plantmix surfacing material, prime coat, tack coat and seal coat shall conform to the requirements of the appropriate sections of the Standard Specifications.

805.12.1 - Replacing Aggregate Base Material

The aggregate base material shall be spread in a uniform layer without segregation and shall be compacted to one hundred (100) percent of the maximum density as determined by AASHTO T 180 Method C or AASHTO T 310.

805.12.2 - Replacing Asphalt Plantmix Surfacing

The Contractor shall saw cut the existing asphalt surface back six (6) to twelve (12) inches from the edge of the excavated trench in a neat, straight line using a method approved by the City Engineer prior to patching. Any fractured,

heaved or otherwise damaged asphalt surface beyond the six (6) to twelve (12) inch offset cut shall be "squared out", as directed by the City Engineer. If the total compacted depth or thickness is greater than three (3) inches, it shall be placed and compacted in two (2) or more lifts of equal thickness.

Immediately prior to placing any asphalt plantmix, the Contractor shall paint all vertical edges of the old asphalt surface and any existing concrete edges with an approved emulsified tack coat, such as CSS-1h diluted to equal parts potable water and asphalt. The asphalt plantmix shall be spread uniformly and without segregation across the entire width of the area where the surfacing has been removed. It shall be spread to such a depth that when compacted to the required density, the patched surface shall match the existing adjacent surfaces. The Contractor shall "rake" all edges to ensure the availability of a sufficient number of fines to seal the joints.

When tested with a ten (10) foot straightedge laid on the finished surface, perpendicular to the trench, the repaired surface shall vary in no place more than one-quarter (1/4) inch from the lower edge of the straightedge. The approved patched surface shall than be seal coated for the entire width plus one (1) foot. Trench seal coating may be either "Gilsabind" (or approved equal) or seal coat meeting the requirements in the Standard Specifications.

805.13 - Repair of Waterways

This section covers the work necessary for the installation of a pipe beneath a waterway, including but not limited to, excavation, special backfill requirements, compaction and permits required for a complete installation. The Contractor shall coordinate his work with the appropriate responsible agency to minimize the disruption of water flow within the channel and gain all necessary permits for completion of the work.

805.13.1 - Trench Seal

The bentonite soil mixture as produced by the Contractor shall be evenly spread into a six (6) inch layer as shown on the Repair of Existing Waterways Detail of the Standard Drawings and compacted to the maximum possible extent. A twelve (12) inch compacted layer of excavated parent soil shall then be placed above the bentonite soil mixture. Compaction shall meet the requirement for Class "A" Backfill. The surface of the interior of the channel in the trench area shall be replaced to resemble, as close as possible, the adjacent channel surface.

805.14 - Non-Shrink Backfill Material

This section covers the work of installing non-shrink backfill material in all trench cuts located within the Idaho Transportation Department right-of-ways, city

arterial and collector streets, any streets or overlays less than fifteen (15) years old and when required by the City Engineer.

All requirements for excavation shall meet the Idaho Transportation Department specifications when working within the State's right-of-ways and the City of Idaho Falls Standard Specifications Section 800 - TRENCH EXCAVATION AND BACKFILL when working within the City's right-of-ways.

The non-shrink backfill material shall be "Non-Shrink" concrete class meeting the requirements of Section 503 - CONCRETE.

After the Contractor has excavated and disposed of all material from the trench area and upon completion of the installation and testing of the installed line, the Contractor shall wrap all mechanical fittings with plastic sheeting (minimum four (4) mil.) in a manner, which will prevent bonding of the non-shrink backfill material to the fitting. The Contractor shall then place non-shrink backfill material in the trench using a method that fills all voids to the top of the existing crushed aggregate base elevation. After sufficient time for the non-shrink backfill material to cure in order to carry the traffic loads, the Contractor shall then replace the asphalt plantmix surfacing in accordance with the applicable section of the Standard Specifications.

809 - MEASUREMENT AND PAYMENT

809.01 - Classified Trench Excavation and Backfill

There shall be no deductions or additions to the quantities determined under this Section for special materials or methods required by any other Section of these Specifications.

809.01.1 - Measurement

Classified Trench Excavation and Backfill shall be measured on a LINEAR FOOT basis along the centerline of the excavated trench, with the end measurements being determined by that point at which the excavated face of the trench end intersects the top surface of the water or sewer pipe being installed. When two (2) trenches join, intersect or when a trench ends at a manhole, inlet box or other similar structure, the length measurement for the trench(es) shall be from inside face to inside face of said manhole, inlet box or other such similar structure. When two (2) trenches intersect at a location where there is no manhole, inlet box or other similar structure (i.e., water line crosses, tees, etc.) the length measurement for each shall be to the intersection of their respective centerlines.

Trench depth shall be measured vertically from the natural ground or street surface at the top of the trench to the bottom surface (exclusive of all bell projections) of the water or sewer line laid in the trench. Any extra excavation below the bottom of the pipe, such as that required through rock cuts, under plastic or copper pipe or through areas of unstable foundation materials, shall not be considered in determining the trench depth measurement. Trench depth measurement shall be grouped in accordance with the following classes:

Class I	0 to 6 feet
Class II	6.01 to 8.00 feet
Class III	8.01 to 10.00 feet
Class IV	10.01 to 12.00 feet
Class V	12.01 to 14.00 feet
Class VI	14.01 to 16.00 feet
Class VII	16.01 feet and greater

809.01.2 - Payment

The various classes of Trench Excavation and Backfill shall be paid at the Contract unit price bid on a LINEAR FOOT basis to the nearest foot. The

payment shall be considered as full compensation for all labor, equipment, materials, water, excavation, hauling, excavation for bell holes, valves, fittings and other appurtenances. If there is no separate bid item in the Contract, the payment shall also be considered as full compensation for the furnishing, placing and the removal of shoring, sheeting and bracing, the necessary tree and/or stump removal and clearing and grubbing operations, the removal and disposal of pavements, curb and gutter, sidewalks and driveways, the removal and replacement of lawn sod, shrubs, fences, etc., furnishing ladders and pedestrian crossings, furnishing and placing of any three-quarter (3/4) inch crushed aggregate material that may be required to restore a trench surface within a graveled roadway or alley to its original gravel condition, the replacement of pavements, curb and gutter, sidewalks and driveways and any and all other items necessary to satisfactorily complete the excavation and backfill work.

809.02 - Unsuitable Material Excavation

809.02.1 - Measurement

Unsuitable Material Excavation shall be measured on a CUBIC YARD basis with the measurement being determined by three (3) dimensional volumetric measurements or other methods approved by the City Engineer.

809.02.2 - Payment

Unsuitable Material Excavation shall be paid at the Contract unit price bid on a CUBIC YARD basis. The payment shall be considered as full compensation for all labor, materials and equipment necessary to haul off the unsuitable material and then furnish and haul the replacement material. The payment shall also include any and all costs associated with the removal and disposal of the unsuitable material that is replaced. Payment for excavation and backfill of the trench where areas of Unsuitable Material Excavation are required shall be by the appropriate classification for those items.

809.03 - Rock Excavation

809.03.1 - Measurement

Rock Excavation shall be measured on a CUBIC YARD or by LINEAR FOOT basis according to the following criteria:

Depth: Depth shall be measured from the actual profiled top of the solid rock surface to a point that is a theoretical distance "D" below the flow line grade of the pipe, with this theoretical distance "D" being that defined and shown in the "ROCK EXCAVATION AND SELECT BACKFILL DIAGRAM" in the Standard Drawings. For pipe structures depth shall be measured from the actual profiled top of the solid rock surface to one (1) foot below the bottom of the structure.

Width: The trench width measurement shall be the diameter of the pipe plus the distance "D" that is on both sides of the pipe, being that defined and shown in the "ROCK EXCAVATION AND SELECT BACKFILL DIAGRAM" in the Standard Drawings. For pipe structures width shall be measured between the limits that form planes, three (3) feet larger than the width of the structure.

Length: Length shall be the actual length of rock excavation measured at theoretical distance "D" below the flow line grade of the pipe. For pipe structures, length shall be measured between the limits that form planes, three (3) feet larger than the length of the structure.

If Rock Excavation measurement is by the LINEAR FOOT then the measurement shall be along the centerline of those portions of trench where rock is drilled, blasted and excavated for pipe installation. Where rock is excavated for installation of manholes, inlet boxes, etc. and the method of measurement is by the LINEAR FOOT then the measurement shall be twice the largest outside horizontal dimension of the pipe structure.

809.03.2 - Payment

Rock Excavation shall be paid at the Contract unit price bid on a CUBIC YARD or LINEAR FOOT basis. The payment shall be considered as full compensation for all labor, materials and equipment necessary to drill, shoot, chip, remove and dispose of all rock as such is necessary to place the water or sewer line, manholes, etc. to the depths required. The payment shall also include any and all costs of furnishing and hauling additional COMMON BACKFILL MATERIAL to replace the removed rock and if there is no separate item for SELECT BACKFILL MATERIAL then it shall also include the cost of SELECT BACKFILL MATERIAL as required around the pipe.

809.04 - Base Stabilization Material

The Contractor shall supply and place Base Stabilization Material as shown in the Plans, as specified, and as directed by the City Engineer. Where there is no separate pay item for Base Stabilization Material the cost of supplying and placing Base Stabilization Material shall be included in other items.

809.04.1 - Measurement

Base Stabilization Material shall be measured on a CUBIC YARD basis with the measurement being determined by three (3) dimensional volumetric measurements or other methods approved by the City Engineer.

809.04.2 - Payment

Base Stabilization Material shall be paid at the Contract unit price bid on a CUBIC YARD basis. The payment shall be considered as full compensation for all labor, materials and equipment necessary to furnish, place and compact the material. The payment shall also include any and all costs associated with the removal and disposal of the unsuitable foundation material that is replaced by the Base Stabilization Material.

809.05 - Select Backfill Material

The Contractor shall supply and place Select Backfill Material as shown in the "ROCK EXCAVATION AND SELECT BACKFILL DIAGRAM" in the Standard Drawings as specified and as directed by the City Engineer. Where there is no separate pay item for Select Backfill Material the cost supplying and placing Select Backfill Material shall be included in other items.

809.05.1 - Measurement

Select Backfill Material shall be measured on a CUBIC YARD basis. When used for bedding as required in Rock Excavation, the measurements shall be as defined in Rock Excavation Measurement, except that the depth shall be the theoretical depth "D". Select Backfill Material used at other places and for other purposes shall be measured by three (3) dimensional volumetric measurements or other methods approved in writing by the City Engineer.

809.05.2 - Payment

Select Backfill Material shall be paid at the Contract unit price bid on a CUBIC YARD basis. The payment shall be considered as full compensation for all labor, materials and equipment necessary to furnish, place and compact the material.

SPECIAL PIPE ZONE MATERIAL required for bedding under plastic and copper pipe will be paid under the requirements for the pipe and no separate payment shall be made for Select Backfill Material when said pipe is installed in areas of Rock Excavation.

809.06 - Special Pipe Zone Material

809.06.1 - Measurement and Payment

Special Pipe Zone Material required for bedding under and around plastic or copper pipe shall be included in the cost of the respective pipe bid item. There shall be no separate measurement and payment item for this Special Pipe Zone Material.

809.07 - Dewatering Material

809.07.1 - Measurement

Dewatering Material shall be measured on a CUBIC YARD basis with the measurement being determined by three (3) dimensional volumetric measurements or other methods approved by the City Engineer.

809.07.2 - Payment

Dewatering Material shall be paid at the Contract unit price bid on a CUBIC YARD basis. The payment shall be considered as full compensation for all labor, materials and equipment necessary to furnish, place and compact the material. The payment shall also include any and all costs associated with the removal and disposal of the unstable foundation material that is replaced by the Dewatering Material.

809.08 - Water for Backfill

809.08.1 - Measurement and Payment

Water for Backfill shall be included in the cost of the respective classified excavation and trench backfilling bid item. There shall be no separate measurement and payment item for this Water for Backfill.

809.09 - Pumice for Insulation

809.09.1 - Measurement

Pumice for Insulation shall be measured on a CUBIC YARD basis. The measurement shall include the furnishing and placing of pumice at locations as shown on the Plans or as directed by the City Engineer.

There shall be no separate measurement made for the filter fabric material. This item shall be incidental to and included in the CUBIC YARD cost of the Pumice for Insulation.

809.09.2 - Payment

Pumice for Insulation shall be paid at the Contract unit price bid on a CUBIC YARD basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to install the Pumice for Insulation complete and in place.

There shall be no separate payment made for the filter fabric material. This item shall be incidental to and included in the CUBIC YARD cost of the Pumice for Insulation.

809.10 - Removal and Replacement of Landscaped Areas

809.10.1 - Measurement

Removal and Replacement of Landscaped Areas shall be measured on a LINEAR FOOT basis along the centerline of the trench with the measurement beginning and ending at those points where the landscaped area removal actually begins and ends or measured longitudinally along cut or fill lines, curb, sidewalk or other disturbed areas.

When two (2) trenches join or intersect at a manhole, inlet box or other similar structure, the length measurement shall be from inside face of said manhole, inlet box or other such similar structure. When two (2) trenches intersect at a location where there is no manhole, inlet box or other similar structure (i.e., water line crosses, tees, etc.), the measurement for each shall be to the intersection of their respective centerlines. The measurements and the payments are based solely on the trench length measurement and are irrespective of the actual width of the trench or depths of the landscaped area.

809.10.2 - Payment

Removal and Replacement of Landscaped Areas shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be considered as full compensation for all labor, materials and equipment necessary to remove and replace the landscaped area, irrespective of the actual trench width and depths of the landscaped area.

809.11 - Removal and Replacement of Asphalt Plantmix and Aggregate Base

809.11.1 - Measurement

Removal and Replacement of Asphalt Plantmix and Aggregate Base shall be measured on a LINEAR FOOT basis along the centerline of the trench with the measurement beginning and ending at those points where the removal actually begins and ends.

When two (2) trenches join or intersect at a manhole, inlet box or other similar structure, the length measurement shall be from inside face of said manhole, inlet box or other such similar structure. When two (2) trenches intersect at a location where there is no manhole, inlet box or other similar structure (i.e., water line crosses, tees, etc.), the measurement for each shall be to the intersection of their respective centerlines. The measurements and the payments are based solely on the trench length measurement and are irrespective of the actual width of the trench or depths of the aggregate base and asphalt plantmix.

809.11.2 - Payment

Removal and Replacement of Asphalt Plantmix and Aggregate Base shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be considered as full compensation for all labor, materials and equipment necessary to remove the existing asphalt surface and aggregate base and to install the new aggregate base and new asphalt plantmix surface, including the seal coat, irrespective of the actual trench width and depths of the aggregate base and asphalt plantmix surface.

809.12 - Repair of Waterways

809.12.1 - Measurement

Repair of Waterways shall be measured on a LINEAR FOOT basis along the centerline of the trench with the measurement being from outside to outside of the irrigation channel banks. The measurement shall include the furnishing of all materials, including Bentonite and any other items required to complete the Repair of Waterways at locations as shown on the Plans or as directed by the City Engineer.

809.12.2 - Payment

Repair of Waterways shall be paid at the Contract unit price bid on a LINEAR FOOT basis. The payment shall be full compensation for all labor, materials, equipment and tools necessary to complete the Repair of Waterways complete and in place.

All pipe, pipe bedding material (if required) and rock excavation shall be paid for separately under their respective bid items.

809.13 - Non-Shrink Backfill Material

809.13.1 - Measurement

Non-Shrink Backfill Material shall be measured on either a LINEAR FOOT or CUBIC YARD basis along the centerline of the trench with the measurement beginning and ending at those points where the trench area excavation actually

begins and ends. Volumetric measurement shall be by the actually quantity of Non-Shrink Backfill placed.

809.13.2 - Payment

Non-Shrink Backfill Material shall be paid at the Contract unit price bid on a LINEAR FOOT or CUBIC YARD basis, complete and in-place. The payment shall be considered as full compensation for all materials, labor, equipment, and incidentals required to place this non Non-Shrink Backfill Material. Any work that is essential to the construction, but for which no bid item is included in the Contract, shall be considered as incidental work and all costs thereof shall be included in the unit price bid for other items.