CONTRACT DOCUMENTS
&
TECHNICAL SPECIFICATIONS

PROJECT NO.

HCBC – UTIL-2016

Hastings Auditorium & Conference Center

Utility Improvements

CITY OF HASTINGS

June, 2016

REGISTERED PROFESSIONAL ENGINEER
DAVID L. WACKER
E-5090
6-28-2016
STATE OF NEBRASKA

ADVERTISEMENT FOR BIDS

The City of Hastings, Nebraska, will receive bids for the construction of the following project:

Project No.

HCBC – UTIL-2016

Hastings Auditorium & Conference Center Utility Improvements

until 10:00 a.m. at the Office of the City Clerk of Hastings, Nebraska, on the 18th day of July, 2016, at which time and place all bids will be publicly opened and read aloud.

The Contract Documents, including plans and specifications, are on file at the Office of the City Clerk of Hastings, 220 N Hastings Avenue, Hastings, Nebraska 68901. Copies of the plans and specifications in electronic (PDF) format may be obtained by contacting: Diane Parker, 402-461-2330, Email dparker@cityofhastings.org or the City of Hastings Website www.cityofhastings.org/bids. A paper copy is available by depositing $75.00, plus sales tax ($5.25), plus shipping. (Non-refundable).

Each bid shall be accompanied by a certified check, drawn on a solvent bank in the State of Nebraska, or a bid bond in an amount of not less than five percent (5%) of the total bid of all contract construction costs, made payable to the City Treasurer of the City of Hastings, Nebraska, as security that the bidder to whom the contract may be awarded will enter into a contract to build all the improvements in accordance with this notice and give bond in the sum hereinafter provided for the construction of improvements.

No bid shall be withdrawn after opening of bids without the consent of the City of Hastings, Nebraska, for a period of Sixty (60) days after scheduled time of closing bids.

Time is of the essence in this contract. In evaluating bid(s) received, the City will consider the timelines of completion of prior construction contracts, existing workload of bidders and available manpower that bidder commits to the project.

The successful bidder will be required to furnish a Performance Bond in the sum of the full amount of the Contract within ten (10) days of the date of award. No additional time will be allowed the Contractor for providing the Performance Bond.

DATED AT HASTINGS, NEBRASKA, this 27th day of June, 2016.

CITY OF HASTINGS, NEBRASKA

_____
Kimberly S Jacobitz, City Clerk

Publish: July 1st, 2016
July 8th, 2016

Furnish 2 proofs of publication

NOTE TO CONTRACTORS/ SPECIAL PROVISIONS:

1. This project provides for the sanitary sewer and storm sewer relocation necessary for the proposed City Block Convention Center located at 3rd and Hastings in Downtown Hastings.
   This project is subject to a referendum petition. Therefore, bids are to be valid for a period of sixty (60) days after the opening of bids.

2. Please check to verify that your bid surety accompanies your bid. Bids not accompanied with a surety will not be read.

3. Project completion is preferred in calendar year 2016.
   Completion date is sixty (60) calendar days after "Notice to Proceed" construction is given.
   If contractor cannot meet this proposed schedule submit anticipated completion date by letter accompanying bid.

4. It is understood and agreed that time is of the essence in the contract. Should the Contractor fail to perform the work within the period of time stipulated in the Contract Agreement, the Contractor shall pay to the City, as liquidated damages and not a penalty, (see table below) per working day of default unless extensions of time granted by the City specifically provide for the waiving of liquidated damages. Deductions will be in accordance with Article 108.08 of the 2007 Nebraska Department of Roads Standard Specifications for Highway Construction and its supplements and revisions.

SCHEDULE OF LIQUIDATED DAMAGES

CONTRACT AMOUNT		LIQUIDATED DAMAGES
More Than	**Up To And Including**	**Per Working Day**
$0	$25,000	$63
$25,000	$50,000	$105
$50,000	$100,000	$154
$100,000	$500,000	$210
$500,000	$1,000,000	$315
$1,000,000	$2,000,000	$420
$2,000,000	$5,000,000	$630
$5,000,000	$10,000,000	$840
$10,000,000		$980

5. The undersigned bidder agrees and understands that bidder will be appointed as Purchasing Agent for the City and will be issued an Exempt Sales Certificate to be used in accordance with specified

6. This contract shall be awarded only to responsible contractors who possess the potential ability to perform successfully under the terms and conditions of the contract. Consideration shall be given to such matters as contract integrity, record of past performance, financial and technical resources or accessibility to other necessary resources.

CITY OF HASTINGS

PROPOSAL

(ALL BIDS MUST BE SUBMITTED ON THIS FORM)

TO MEMBERS OF THE CITY COUNCIL
CITY OF HASTINGS
HASTINGS, NEBRASKA

THE UNDERSIGNED, having examined the plans, specifications, general and special conditions and other contract documents, including any addenda thereto, and being acquainted with and fully understanding (a) the extent and character of the work covered by this proposal, (b) the location, arrangement, character, conditions of existing streets, roads, highways, railroads, pavements, surfacing, walks, driveways, curbs, gutters, trees, sewers, utilities, drainage courses and structures and other installations, both surface and underground, which may affect or be affected by the proposed work, (c) the nature and extent of the embankments and excavations to be made and the type, character and general condition of materials to be filled and excavated, (d) the necessary handling and re-handling of excavated materials, (e) the difficulties and hazards to the work which might be caused by storm and flood water, (f) local conditions relative to labor, transportation, hauling and rail facilities and (g) all other factors and conditions affecting or which may be affected by the work;

HEREBY PROPOSES to furnish all required materials, supplies, equipment, tools and plant, to perform all necessary labor and supervision and to construct, install, erect, equip and complete all work stipulated in, required by and in accordance with the contract documents and the plans, specifications and other documents referred to therein (as altered, amended or modified by all addenda thereto) for and in consideration of the following proposal for:

Project No.

HCBC – UTIL-2016

Hastings Auditorium & Conference Center Utility Improvements

Contractor's Progress Estimate
PROJECT NO. HCBC - UTIL-2016
Hastings Auditorium & Conference Center Utility Improvements

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITIES	UNIT	UNIT PRICE	AMOUNT
1	48" Diameter Precast Concrete Manhole	5	EACH	$ _____	$ _____
2	10" PVC Sanitary Sewer	697	L.F.	$ _____	$ _____
3	8" PVC Sanitary Sewer	188	L.F.	$ _____	$ _____
4	Connect to Existing Sanitary Sewer	2	EACH	$ _____	$ _____
5	Tap Existing Manhole	1	EACH	$ _____	$ _____
6	Remove Brick Manhole	1	EACH	$ _____	$ _____
7	8" PVC Sanitary Sewer Service	4	L.F.	$ _____	$ _____
8	6" PVC Sanitary Sewer Service	158	L.F.	$ _____	$ _____
9	6" PVC 45 degree Bend	2	EACH	$ _____	$ _____
10	Sanitary Sewer Cleanout	2	EACH	$ _____	$ _____
11	Storm Sewer Manhole	5	EACH	$ _____	$ _____
12	Curb Inlet	3	EACH	$ _____	$ _____
13	Area Inlet	1	EACH	$ _____	$ _____
14	42" R.E. Arch RCP Storm Sewer Pipe	911	L.F.	$ _____	$ _____
15	18" RCP Storm Sewer Pipe	14	L.F.	$ _____	$ _____
16	10" HDPE Storm Sewer	23	L.F.	$ _____	$ _____
17	Tap Storm Sewer Pipe	3	EACH	$ _____	$ _____
18	Concrete Collar	3	EACH	$ _____	$ _____
19	Fire Hydrant Assembly	1	EACH	$ _____	$ _____
20	Wet Cut-In	6	EACH	$ _____	$ _____
21	4" M.J. Plug	7	EACH	$ _____	$ _____
22	6" M.J. 45 degree Bend	4	EACH	$ _____	$ _____
23	6" M.J. Plug	4	EACH	$ _____	$ _____
24	4" M.J. 45 degree Bend	6	EACH	$ _____	$ _____
25	4"M.J. 90 degree Bend	2	EACH	$ _____	$ _____
26	8"x 6" M.J. Tee	1	EACH	$ _____	$ _____
27	10"x 6" M.J. Tee	2	EACH	$ _____	$ _____
28	10"x 4" M.J. Tee	1	EACH	$ _____	$ _____
29	10" M.J. Solid Sleeve	6	EACH	$ _____	$ _____
30	Abandon Existing Water Service	4	EACH	$ _____	$ _____
31	Remove Fire Hydrant Assembly	2	EACH	$ _____	$ _____

32	Remove Utility Manhole	2	EACH	$ _____	$ _____
33	Remove Existing 4" Gate Valve	3	EACH	$ _____	$ _____
34	10"x 6" Tapping Tee with Valve (By HU)	1	EACH	$ _____	$ _____
35	10"x 4" Tapping Tee with Valve (By HU)	1	EACH	$ _____	$ _____
36	6" M.J. Gate Valve with Box	2	EACH	$ _____	$ _____
37	4" M.J. Gate Valve with Box	3	EACH	$ _____	$ _____
38	10" Dip Water Main	30	L.F.	$ _____	$ _____
39	6" Dip Water Service	213	L.F.	$ _____	$ _____
40	4" Dip Water Service	390	L.F.	$ _____	$ _____
41	6" Concrete Pavement	241	S.Y.	$ _____	$ _____
42	4" Concrete Sidewalk	6	S.Y.	$ _____	$ _____
43	Pavement Patch	206	S.Y.	$ _____	$ _____
44	Remove Gas Line	310	L.F.	$ _____	$ _____
45	Remove Pavement	2560	S.Y.	$ _____	$ _____
46	Remove Sidewalk	1112	S.Y.	$ _____	$ _____
47	Remove Storm Sewer	451	L.F.	$ _____	$ _____
48	Remove Storm Sewer Inlet	5	EACH	$ _____	$ _____
49	Remove Tree	3	EACH	$ _____	$ _____
50	Remove Utility Manhole	2	EACH	$ _____	$ _____
51	Traffic Control/Barricades & Maintenance thereof	1	Lump Sum	$ _____	$ _____

TOTAL $ _____

Amount shall be shown in both words and figures.
In case of a discrepancy, the amount shown in words will govern.

The undersigned bidder agrees to furnish the required performance bond and to enter into a contract within ten (10) days after acceptance of the Proposal and further agrees to complete all work covered by the foregoing Proposal in accordance with specified requirements. The proposed work is to commence as soon as possible after the contract is signed and the required bond is approved with completion of work on or before **Sixty (60) calendar days after "Notice to Proceed". (SEE SPECIAL PROVISIONS)**

Enclosed herewith is the required bid bond in the amount of 5% of Base Bid which the undersigned bidder agrees is to be forfeited to and become the property of the City of Hastings, Nebraska, as liquidated damages should this proposal be accepted and a contract awarded to bidder and bidder fail to enter into a contract in the form prescribed and to furnish the required performance bond within ten (10) days, but otherwise the aforesaid proposal guarantee will be returned upon bidder signing the contract and delivering the approved performance bond.

In submitting this bid, it is understood that the right is reserved by the City to reject any and all bids, and it is understood that this bid may not be withdrawn during a period of sixty (60) days after the scheduled time for the receipt of bids.

The undersigned bidder hereby certifies (a) that this bid is genuine and is not made in the interest of, or on the behalf of, any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation, (b) that bidder has not directly or indirectly induced or solicited any person, firm or corporation to refrain from bidding, (c) that bidder has not sought, by collusion or otherwise, to obtain for himself an advantage over any other bidder or over the City of Hastings and (d) that bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid.

DATED IN _____ this _____ day of _____, 2016.

I/We hereby acknowledge receipt of Addenda Nos. _____.

SIGNATURE OF BIDDER:

If an Individual: _____ doing business as

_____

If a Partnership: _____

By: _____
Member of Firm

If a Corporation: _____

By: _____

Title: _____

Business Address of Bidder:

_____

_____

_____

AGREEMENT

This Agreement is made and entered into this _____ day of _____, 2016, by and between the City of Hastings, Nebraska, a Municipal Corporation, hereinafter referred to as the "City", and _____, hereinafter referred to as the "Contractor".

1. Improvements. The Contractor hereby agrees to construct certain improvements for the City, described as follows:

Project No.

HCBC – UTIL-2016

Hastings Auditorium & Conference Center Utility Improvements

In connection with construction of the improvements, the Contractor will furnish all labor, tools, equipment and materials.

2. Price. For and in consideration of the construction of the improvements, the City agrees to pay to the Contractor the sum of $_____. The time and manner of payment shall be set forth in the contract document.

3. Specifications. The Contractor shall construct the improvements in accordance with the project specifications.

4. Project Manager. The City hereby designates the City Engineer as the Project Manager. The City Engineer may appoint a member of the Engineering Department Staff to so serve in his place. The Project Manager shall interpret and construe the contract documents and reconcile any apparent or alleged conflicts and inconsistencies therein. All work upon the improvements shall be subject to the approval of the Project Manager. The Project Manager shall determine any and all questions that arise concerning the performance of the work, the workmanship, quality of materials, acceptability of the completed project and the contract documents. The decision of the Project Manager shall be final, conclusive and binding.

5. Schedule. The Contractor shall perform and complete all work within the time and in the manner established by the project specifications.

6. Performance Bond. To ensure prompt, faithful, sufficient and complete performance of this contract, the Contractor shall, upon execution of this contract, furnish to the City a performance bond issued by one or more sureties acceptable to the City. Said bond shall be in the full amount of the contract price and shall ensure the faithful performance of the contract. The bond shall be in a form acceptable to the City.

7. No Encumbrances. The work and materials for the project shall be completely installed and delivered to the City within the time provided herein free and clear of all liens, claims, encumbrances or demands of any kind.

8. Contract Documents. This contract shall consist of component parts, all of which are as fully a part of the contract as if set forth herein, or if not attached, as if hereto attached:

(a) Agreement (this instrument)

(b) Advertisement for Bids

(c) Proposal

(d) Performance Bond

(e) Technical Specifications

(f) Special Provisions General Requirements

(g) Plans and Typical Sections

(h) Addenda Nos.:

(i) Multiple Counterparts – This agreement may be executed in multiple counterparts containing the signatures of all parties on one or more counterparts, and each counterpart shall be considered an original of this document.

9. Applicable Law. The Contract shall comply with all applicable local, state and federal laws and regulations, which shall include but not be limited to: State of Nebraska Standard Specifications for Highway Construction, Series 2007 English Units Department of Roads and its Supplements or Revisions; National Electric Code 2008; International Building Code 2009; International Fire Code 2003; NFPA Pamphlet No. 54, 2012; International Plumbing Code 2012, Uniform Mechanical Code 2009.

DATED this day and year first above written.

_____
CONTRACTOR

By: _____

Title: _____

CITY OF HASTINGS

By: _____

Title: _____

ATTEST:

_____
City Clerk

(SEAL)

APPROVED AS TO FORM:

_____
City Attorney

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, the undersigned, _____,
as principal, and _____,
a corporation organized and existing under the laws of the State of _____,
and duly authorized to transact business in the State of Nebraska, as surety are held and firmly bound unto the CITY OF HASTINGS, NEBRASKA, a municipal corporation organized and existing under the laws of the State of Nebraska, hereinafter referred to as CITY, in the penal sum of _____ _____ Dollars ($_____), lawful money of the United States, for the payment of which will and truly be made, we the said principal and the said surety do hereby bind ourselves, our heirs, executors, administrators and assigns, jointly and severally, by these presents as follows:

The condition of this obligation is such that, whereas the principal, by an instrument in writing attached hereto and bearing the date of _____, 20____, has agreed with the CITY to do all work necessary and to furnish all labor, materials, supplies, tools and equipment to _____
_____
_____
_____

as specified thereby and in the specifications, proposals and contract forming the Contract Documents attached thereto and made a part hereof:

NOW THEREFORE, if the principal shall well and truly in good, sufficient and in a workmanlike manner, and to the satisfaction of the CITY perform and complete the work required, and shall defend, indemnify and save harmless the CITY against all damages, claims, demands, expenses and charges of every kind (including claims of patent infringement) arising from any act, omission or neglect of said principal, his agents, servants or employees, with relation to said work, and shall pay all costs, charges, rentals and expenses for labor, materials, supplies and equipment and deliver the said improvement to the CITY completed and ready for operation and free from all encumbrances or claims for labor, materials or otherwise, and shall pay all other expenses lawfully chargeable to the CITY, and this bond shall also be for the use and benefit of all persons who may perform any work or labor or furnish any material in the execution of said Contract and may be sued on thereby in the name of any such party claiming the benefit hereof, then this obligation shall be void, otherwise the same shall remain in full force and effect. This obligation shall be in full force and effect for the full guarantee period provided in the specifications contained herein.

PROVIDED FURTHER, that said surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any change, extension of time, alteration or addition to terms of the Contract, to the work or to the specifications.

PROVIDED FURTHER, that if the principal of his, their or its subcontractor or subcontractors fail to duly pay for any labor, materials team, hire sustenance, provisions, provender or any other supplies or materials used or consumed by such contractor of his, their or its subcontractors in performance of the work contracted to be done, the surety will pay the same in any amount not exceeding the sum specified in the bond together with interest as provided by law.

IT WITNESS WHEREOF, said principal and surety have hereunto set their hands and seals at ___ _____ this _____ day of _____, 20____,

This Bond is executed in triplicate counterparts.

_____
Principal

(SEAL)

_____
Street Address

_____
Witness

_____
City, State, Zip

_____
Name of Person Executing

ATTEST:

_____
Surety

_____

By: _____
Title: _____

Nebraska Department of **REVENUE**

Purchasing Agent Appointment

and Delegation of Authority for Sales and Use Tax

FORM **17**

PURCHASING AGENT APPOINTMENT

Name and Address of Prime Contractor	Name and Address of Governmental Unit or Exempt Organization
Name	Name
Street or Other Mailing Address	Street or Other Mailing Address
City State Zip Code	City State Zip Code

Name and Location of Project	Appointment Information
Name	Effective Date (see Instructions)
Street or Other Mailing Address	Expiration Date
City State Zip Code	Nebraska Exemption Number (Exempt Organizations Only)
Identify Project	

The undersigned governmental unit or exempt organization appoints the above-named contractor and the contractor's delegated subcontractors as its agent to purchase and pay for building materials that will be annexed to real estate by them into the tax exempt construction project stated above.

sign here ▶ Authorized Signature of Governmental Unit or Exempt Organization | Title | Date

DELEGATION OF PRIME CONTRACTOR'S AUTHORITY

Name and Address of Subcontractor	Delegation Information
Name	Effective Date
Street or Other Mailing Address	Expiration Date
City State Zip Code	Portion of Project

The undersigned prime contractor hereby delegates authority to act as the purchasing agent of the named governmental unit or exempt organization to the above-named subcontractor.

sign here ▶ Signature of Prime Contractor or Authorized Representative | Title | Date

INSTRUCTIONS

WHO MUST FILE. Any governmental unit or organization that is **exempt** from sales and use tax may appoint as its agent a prime contractor to purchase building materials and/or fixtures that will be annexed to property that belongs to or will belong to the governmental unit or exempt organization pursuant to a construction contract with the governmental unit or exempt organization. The appointment of the prime contractor as its agent is completed by issuing a Purchasing Agent Appointment and Delegation of Authority for Sales and Use Tax, Form 17, to the prime contractor. The Form 17 is required to be given to the contractor **BEFORE** he or she annexes building materials. The governmental unit or exempt organization must identify the project (e.g., east wing, chapel construction, or new school auditorium). Most nonprofit organizations are NOT exempt from sales tax in Nebraska. In addition, not all governmental units are exempt from Nebraska sales tax. Refer to Contractor Information on our Web site for additional information on exempt entities. A contractor can confirm the exempt status of a governmental unit or exempt organization by contacting the Nebraska Department of Revenue.

The exemption from the payment of the Nebraska and local option sales and use taxes only applies if the governmental unit or exempt organization directly, or through its contractor, pays for the building materials. **IMPORTANT NOTE:** When an organization that requires licensure in order to be exempt (i.e., nonprofit hospitals), but is not licensed at the time of the construction project, the exempt organization **CANNOT**

issue either a purchasing agent appointment or an exemption certificate. If the exempt organization becomes licensed upon completion of the project, it may apply for a refund of the tax paid or collected by the contractors.

WHEN TO FILE. A prime contractor engaging in a construction project with a governmental unit or exempt organization must receive a properly completed and signed Form 17 **BEFORE** any building materials are annexed. If Form 17 is not issued, the contractor must pay the sales and use taxes and the governmental unit or exempt organization may obtain a refund of the taxes paid by the contractor.

WHERE TO FILE. A copy of the completed form should be retained by the governmental unit or exempt organization issuing the Form 17. The original is to be retained by the prime contractor. Copies of this form must be made by the prime contractor for delegation purposes to any subcontractors working on the project identified on this form.

APPOINTMENT INFORMATION. Enter the dates the purchasing agent appointment will become effective and when it will expire. This appointment will not allow any purchases without payment of the tax by the prime contractor or subcontractor before the effective date or after the expiration date. The dates the delegation becomes effective and the expiration dates must be completed. The phrase "upon completion" or similar phrase is not acceptable as an expiration date. The governmental unit or exempt organization may need to issue another Form 17 if the project is not completed within the prior "effective" and "expiration" dates. Exempt organizations must enter their Nebraska Sales and Use Tax Exemption number.

DELEGATION OF PRIME CONTRACTOR'S AUTHORITY. The prime contractor may delegate his or her authority to act as the purchasing agent of the governmental unit or exempt organization to a subcontractor. The prime contractor must complete his or her copy of Form 17 for each subcontractor who is delegated authority to act as a purchasing agent. Reproductions of this delegation must be provided to the subcontractor, who must retain a copy for his or her records, and to the governmental unit or exempt organization.

Enter the dates the delegation of the subcontractor will become effective, when it will expire, and the portion of the project delegated. This delegation will not allow any purchases without payment of the tax by the subcontractor before the delegation date or after the expiration date. Any further delegation from a subcontractor to additional subcontractors must be delegated by providing a copy of the Form 17 that they received from the prime contractor and attaching it to a separate Form 17 with any further delegation to other subcontractors. The purchasing agent appointment is limited to the contractor's purchase of building materials and/or fixtures for the specific project and is only valid during the appointment dates shown on the Form 17.

EXEMPT SALE CERTIFICATE. A prime contractor who has been appointed to act as a purchasing agent by a governmental unit or exempt organization, and who hires a subcontractor operating as an Option 1 contractor, must provide to that subcontractor a completed copy of Form 17 and a Nebraska Resale or Exempt Sale Certificate, Form 13, with Section C, Part 2, completed. The subcontractor will retain these forms in his or her records, and will not charge the contractor sales tax on any portion of the invoice involving the annexation of materials to the specific project identified on the Form 17. If these forms are not provided to the subcontractor operating under Option 1, the subcontractor must collect and remit sales tax on the charge for the separately stated building materials portion of the invoice. If the Option 1 subcontractor does not separately state the charge for the building materials from contractor labor, then the entire charge is taxable to the prime contractor.

Contractors operating under Option 2 (maintaining a tax-paid inventory) who have been issued a Form 17 from a governmental unit or an exempt organization, must furnish each vendor a copy of the Form 17 and a Form 13, completing Section C, Part 2, when purchasing building materials that will be annexed to real estate. Forms 13 and 17 must be retained with the vendor's and contractor's records for audit purposes. A contractor or subcontractor may reproduce copies of these documents which will be furnished to the vendors for each invoice or order made by them.

Invoices from vendors for the purchase of building materials by the contractor as purchasing agent, or the authorized subcontractor, must clearly identify that such purchase is for the specific Form 17 project.

CREDIT/REFUND OF SALES AND USE TAX. A contractor or subcontractor who has been appointed as a purchasing agent before any materials are annexed, may withdraw sales or use tax-paid materials from inventory that will be annexed to real estate or used to repair property annexed to real estate and receive a credit for the sales or use tax amount previously paid on those materials.

The contractor or subcontractor may take a credit either against his or her current tax liability, or file a Claim for Overpayment of Sales and Use Tax, Form 7, and receive a refund of the sales or use tax paid on those materials.

TOOLS, EQUIPMENT, AND SUPPLIES. The purchase, rental, or lease of tools, supplies, or equipment (i.e., scaffolding, barricades, machinery, etc.) by a contractor for use in the completion of an exempt project CANNOT be purchased tax free, even if the contractor has been issued a Form 17. These items do not become annexed to the real estate.

OPTION 1 CONTRACTOR ONLY. If an Option 1 contractor is the **only** contractor involved in performing work for a governmental unit or exempt organization, a Form 17 is NOT required. The Option 1 contractor must only obtain a Form 13, Section B, from the exempt project owner.

PENALTY. Any person who signs this document with the intent to evade payment of tax is liable for the sales and use tax, interest, and penalty, and may be found guilty of a misdemeanor.

AUTHORIZED SIGNATURE. The purchasing agent appointment must be signed by an officer of the exempt organization or proper government official. The delegation of prime contractor's authority must be signed by the owner, partner, corporate officer, or other individual authorized to sign by a power of attorney on file with the Nebraska Department of Revenue.

Nebraska Department of REVENUE

Nebraska Resale or Exempt Sale Certificate

for Sales Tax Exemption

Form 13

Name and Mailing Address of Purchaser	Name and Mailing Address of Seller
Name	Name
Legal Name	
Street Address (Do not use PO Box)	Street or Other Mailing Address
City State Zip Code	City State Zip Code

Check Type of Certificate

☐ Single Purchase If single purchase is checked, enter the related invoice or purchase order number _____.

☐ Blanket If blanket is checked, this certificate is valid until revoked in writing by the purchaser.

I hereby certify that the purchase, lease, or rental by the above purchaser is exempt from the Nebraska sales tax for the following reason:

Check One ☐ Purchase for Resale (Complete Section A.) ☐ Exempt Purchase (Complete Section B.) ☐ Contractor (Complete Section C.)

Section A—Nebraska Resale Certificate

I hereby certify that the purchase, lease, or rental of _____ (Description of Property or Service Purchased) from the seller listed above is exempt from the Nebraska sales tax as a purchase for resale, rental, or lease in the normal course of our business. The property or service will be resold either in the form or condition in which it was purchased, or as an ingredient or component part of other property or service to be resold.

I further certify that we are engaged in business as a: ☐ Wholesaler ☐ Retailer ☐ Manufacturer ☐ Lessor

of Description of Product or Service Sold, Leased, or Rented

_____.

My Nebraska Sales Tax Permit Number is 01-_____.

If none, state the reason _____,

or Foreign State Sales Tax Number_____ State _____.

Section B—Nebraska Exempt Sale Certificate

The basis for this exemption is exemption category _____ (insert appropriate number for the category of exemption described on the reverse side).

If exemption category 2 or 5 is claimed, enter the following information:

Description of Items Purchased _____ Intended Use of Items Purchased _____.

If exemption category 3 or 4 is claimed, enter your Nebraska Exemption Certificate number. 05-_____

Do **not** enter your Federal Employer ID Number.

If exemption category 6 is claimed, the seller must enter the following information and sign this form below:

Description of Items Sold	Date of Seller's Original Purchase	Was tax paid when purchased by seller?	Was item depreciable?
		☐ Yes ☐ No	☐ Yes ☐ No

Section C—For Contractors Only

1. Purchase of building materials or fixtures.

☐ As an Option 1 or Option 3 contractor, I hereby certify that the purchase of building materials and fixtures from the seller listed above are exempt from Nebraska sales tax. My Nebraska Sales or Use Tax Permit Number is: _____.

2. Purchases made by an Option 2 contractor under a Purchasing Agent Appointment on behalf of_____ (exempt entity)

_____.

As an Option 2 contractor, I hereby certify that the purchase of building materials and fixtures from the seller listed above is exempt from Nebraska sales tax pursuant to the **attached** Purchasing Agent Appointment and Delegation of Authority for Sales and Use Tax, Form 17.

Any purchaser, agent, or other person who completes this certificate for any purchase which is not for resale, lease, or rental in the regular course of the purchaser's business, or is not otherwise exempted from sales and use taxes is subject to a penalty of $100 or ten times the tax, whichever amount is larger, for each instance of presentation and misuse. With regard to a blanket certificate, this penalty applies to each purchase made during the period the blanket certificate is in effect. Under penalties of law, I declare that I am authorized to sign this certificate, and to the best of my knowledge and belief, it is correct and complete.

sign here ▶ _____ Authorized Signature _____ Title _____ Date

_____ Authorized Signature Name (please print)

Do not send this certificate to the Nebraska Department of Revenue. Keep it as part of your records.
Sellers cannot accept incomplete certificates.
revenue.nebraska.gov, 800-742-7474 (NE and IA), 402-471-5729

6-134-1970 Rev. 10-2014
Supersedes 6-134-1970 Rev. 3-2009

Instructions

Who May Issue a Resale Certificate. Form 13, Section A, is issued by persons or organizations making purchases of property or taxable services that will subsequently be resold in the purchaser's normal course of business. The property or services must be resold in the same form or condition as when purchased, or as an ingredient or component part of other property that will be resold.

Who May Issue an Exempt Sale Certificate. Form 13, Section B, may only be issued by governmental units and persons or organizations that are exempt from paying Nebraska sales and use tax. Nonprofit organizations that are exempt from paying sales and use tax are listed in the Nebraska Sales Tax Exemption Chart.

Enter the appropriate number from the "Categories of Exemption" in the space provided that properly reflects the basis for your exemption. If category 2 through 6 is the basis for exemption, you must complete the information requested in Section B.

For additional information about proper issuance and use of this certificate, please review Reg-1-013, Sale for Resale – Resale Certificate, and Reg-1-014, Exempt Sale Certificate.

Contractors. To make tax-exempt purchases of building materials and fixtures, Option 1 or Option 3 contractors must complete Form 13, Section C, Part 1.

To make tax-exempt purchases of building materials and fixtures pursuant to a construction project for an exempt governmental unit or an exempt nonprofit organization, Option 2 contractors must complete Form 13, Section C, Part 2. The contractor must also attach a copy of a properly completed Purchasing Agent Appointment and Delegation of Authority for Sales and Use Tax, Form 17, to the Form 13, and both documents must be given to the supplier when purchasing building materials. See the contractor information guides for additional information.

When and Where to Issue. The Form 13 must be given to the seller at the time of the purchase to document why sales tax does not apply to the purchase. The Form 13 must be kept with the seller's records for audit purposes (see Reg-1-012, Exemptions). Do not send Forms 13 to the Nebraska Department of Revenue.

Sales Tax Number. A purchaser who is engaged in business as a wholesaler or manufacturer is not required to provide an ID number when completing Section A. Out-of-state purchasers may provide their home state sales tax number. Section B does not require a Nebraska ID number when exemption category 1, 2, or 5 is indicated.

Fully Completed Resale or Exempt Sale Certificate. For a resale certificate to be fully completed, it must include: (1) identification of the purchaser and seller, type of business engaged in by the purchaser, and reason for the exemption; (2) sales tax permit number; (3) signature of an authorized person; and (4) the date of issuance.

For an exempt sale certificate to be fully completed, it must include: (1) identification of purchaser and seller; (2) a statement that the certificate is for a single purchase or is a blanket certificate covering future sales; (3) a statement of the basis for exemption, including the type of activity engaged in by the purchaser; (4) signature of an authorized person; and (5) the date of issuance.

Penalties. Any purchaser who gives a Form 13 to a seller for any purchase which is other than for resale, lease, or rental in the **normal** course of the purchaser's business, or is not otherwise exempted from sales and use tax under the Nebraska Revenue Act, is subject to a penalty of $100 or ten times the tax, whichever is greater, for each instance of presentation and misuse. In addition, any purchaser, or their agent, who fraudulently signs a Form 13 may be found guilty of a Class IV misdemeanor.

Categories of Exemption

1. Governmental agencies identified in Reg-1-012, Exemptions; Reg-1-072, United States Government and Federal Corporations; and Reg-1-093, Governmental Units. Governmental units are not assigned exemption numbers.

   Sales to the United States government, its agencies, instrumentalities, and corporations wholly owned by the U.S. government are exempt from sales tax. However, sales to institutions chartered or created under federal authority, but which are not directly operated and controlled by the United States government for the benefit of the public, generally are taxable. For construction projects for federal agencies, see Reg-1-017, Contractors.

   Purchases by governmental units that are **not** exempt from Nebraska sales and use taxes include, but are not limited to: governmental units of other states; sanitary and improvement districts; rural water districts; railroad transportation safety districts; and county historical or agricultural societies.

2. Purchases when the intended use renders it exempt as stated in paragraph 012.02D of Reg-1-012, Exemptions. See Nebraska Sales Tax Exemption Chart. Complete the description of the item purchased and the intended use on the front of Form 13.

   Beginning October 1, 2014, sales of repair and replacement parts for agricultural machinery and equipment used in commercial agriculture are exempt from sales and use taxes. When claiming this exemption, please enter "commercial agriculture" on the **Intended Use of Items Purchased** line.

3. Purchases made by organizations that have been issued a Nebraska Exempt Organization Certificate of Exemption. Reg-1-090, Nonprofit Organizations; Reg-1-091, Religious Organizations; and Reg-1-092, Educational Institutions, identify these organizations. These organizations are issued a Nebraska state exemption ID number. This exemption number must be entered in Section B of Form 13.

   Nonprofit **health care organizations** that hold a certificate of exemption are exempt for purchases of items for use at their facility, or portion of the facility, covered by the license issued under the Health Care Facility Licensure Act. Only specific types of health care facilities and activities are exempt. Purchases of items for use at facilities that are not covered under the license, or for any other activities that are not specifically exempt, are taxable.

4. Purchases of common or contract carrier motor vehicles, trailers, and semitrailers; accessories that physically become part of a common or contract carrier vehicle; and repair and replacement parts for these vehicles. The exemption number must be entered in Section B of the Form 13.

5. Purchases of manufacturing machinery and equipment made by a person engaged in the business of manufacturing, including repair and replacement parts or accessories, for use in manufacturing.

6. Occasional sales of used business or farm machinery or equipment productively used by the seller as a depreciable capital asset for more than one year in his or her business. The seller must have previously paid tax on the item being sold. The seller must complete, sign, and give the exemption certificate to the purchaser.

TABLE OF CONTENTS

General Provisions:

Section A—Definitions of Words and Terms 1

Section B—Legal Relations and Responsibility to the Public 1

Technical Specifications Division I—General Requirements 5

Technical Specifications Division II—Sitework:

Section A—Clearing and Grubbing 13

Section B—Earthwork 13

Section C—Foundation Course 13

Section D—Asphaltic Concrete 14

Section E—Performance Graded Binder 14

Section F—Portland Cement Concrete Pavement, Curb Wall, Integral Curb, Curb and Gutter and Sidewalk, Structural Concrete, Reinforcing Steel 42

Section G—Pavement, Curb and Gutter, Sidewalk and Drive Removal 43

Section H—Removal of Existing Structures 44

Section I—Reinforced Concrete Pipe 45

Section J—Catch Basins, Manholes, Inlets and Junction Boxes 46

Section K—Sanitary Sewer 47

Section L—Water Mains 63

Section M—Topsoil, Seeding, Mulching, Fertilizing & Erosion Control . . . 84

Section N—Polyurea Pavement Marking, Grooved. . . . . N/A

Section O—Method of Payment 90

Section P—Guarantee of Workmanship and Materials 90

Special Plan – Curb Ramps. 91

GENERAL PROVISIONS

Section A—Definitions of Words and Terms.

The State of Nebraska Standard Specifications for Highway Construction, Series 2007, Department of Roads, Bureau of Highways and its supplements are hereby incorporated as the General Specifications for the City of Hastings, Nebraska, herein after referred to as "2007 Standard State Specifications". Copies of these specifications may be obtained from the Department of Roads, Lincoln, Nebraska or on their website at www.dor.state.ne.us.

The following changes shall be made in Section 101., DEFINITIONS OF WORDS AND TERMS:

101.0327 Department	The City of Hastings Engineering Department which is authorized to improve and maintain the streets and alleys of the City of Hastings, Nebraska
101.0334 Engineer	The term State Engineer shall be amended to read City Engineer
101.0379 State	This term shall be construed to mean the City of Hastings
101.0358 Project	The specific section of the streets, alleys, parks or area of proposed construction together with all appurtenances and construction to be performed thereon under the contract
101.0367 Roadbed	The term "highway" shall be amended to word "street"
101.0370 Roadway	The portion of the highway within limits of construction; Term "highway" shall be amended to word "street"

Section B—Legal Relations and Responsibility to the Public.

Article 107 of the State of Nebraska Standard Specifications for Highway Construction, Series 2007, Department of Roads, Bureau of Highways, is hereby supplemented as follows:

1. Contractor to Protect and Hold the Owner Harmless.

The Contractor shall protect, defend, indemnify and save harmless the Owner and the Owner's officers, agents, servants and employees, hereinafter called the "Owner", against all claims and actions and all expenses incidental to the defense of such claims or actions, based upon or arising out of injuries or death of persons or damage to property caused by or sustained in connection with this contract or by conditions created thereby, and on request of the Owner will assume the defense of any claim or action brought against the Owner.

2. Contractor's and Subcontractor's Insurance.

Contractor shall not commence work under this contract until he has obtained the insurance required under this paragraph and such insurance has been approved by the Owner, nor shall the Contractor permit any subcontractor to commence work on his subcontract until similar insurance required of the subcontractor has been so obtained and approved.

A. Worker's Compensation and Employer's Liability Insurance

The Contractor shall take out and maintain during the life of this Contract, if applicable, statutory Worker's Compensation Insurance with an insurance company authorized to write such insurance in the applicable state covering all his employees. In the case of any work sublet, the Contractor shall require each Subcontractor similarly to provide statutory Worker's Compensation Insurance for the Subcontractor's employees.

The Contractor shall take out and maintain during the life of this Contract, Employer's Liability Insurance with a minimum limit of $500,000 with an insurance company authorized to write such insurance in all states where the Contractor will have employees located in the performance of this Contract. The Contractor shall require each of his Subcontractors similarly to maintain Employer's Liability Insurance on his employees.

B. Public Liability Insurance

1. The Contractor shall maintain during the life of this Contract such Public Liability Insurance as shall protect him against claims for damages resulting from (a) bodily injury, including wrongful death and (b) property damage, which may arise from operations under this Contract, whether such operations be by himself or by any Subcontractor or anyone directly or indirectly employed by either of them. The minimum acceptable limits of liability to be provided by such Public Liability Insurance shall be as follows:

a.	Bodily Injury Limits:	$1,000,000 Each Occurrence $2,000,000 Aggregate
	Property Damage Limits:	$1,000,000 Each Occurrence $2,000,000 Aggregate

OR

b.	Combined Single Limit:	$2,000,000 Aggregate

2. The Public Liability Insurance required by the preceding Subparagraph 1 shall include the following forms of coverage:

   a. The coverage shall be provided under a Comprehensive General Liability form of policy or similar thereto.

   b. X.C.U. Coverage – If the Contract requires any work procedures involving blastings, excavating, tunneling or other underground work, the liability coverage shall include Standard Blasting or Explosion Coverage, Standard Collapse Coverage and Standard Underground Coverage, commonly referred to as XCU property damage liability coverage with limits of $1,000,000 each occurrence and $2,000,000 aggregate.

   c. The property damage coverage shall include a Broad Form Property Damage Endorsement.

   d. Contractual Liability coverage shall be included.

   e. Protective Liability coverage shall be included to protect the Contractor against claims arising out of operations performed by his Subcontractors.

   f. Products Liability and/or Completed Operations coverage shall be included.

3. Automobile Liability Insurance

The Contractor shall take out and maintain during the life of the Contract such Automobile Liability Insurance as shall protect him against claims for damages resulting from (1) bodily injury, including wrongful death and (2) property damage, which may arise from the operations of any owned, hired or non-owned automobiles used by or for him in any capacity in connection with the carrying out of this Contract. The minimum acceptable limits of liability to be provided by such Automobile Liability Insurance shall be as follows:

A. Bodily Injury Limits:	$1,000,000	Per Person
	$1,000,000	Per Accident
Property Damage Limits:	$1,000,000	Per Accident

OR

B. Combined Single Limit:	$1,000,000	Per Accident

4. Umbrella Liability Coverage

A minimum $2,000,000 limit will be required on all contracts. The City of Hastings retains the right to require a higher limit on a contract of higher value and/or complexity of work.

5. Certificate of Insurance

The Contractor shall furnish the City with two (2) copies of a certificate of insurance evidencing policies required in Paragraphs 2A, 2B, and 3 above. Such certificate shall specifically indicate that the Public Liability Insurance includes all extensions of coverage required in Paragraph 2B, Subparagraphs 1 and 2 above. Such certificate shall specifically state that the insurance company or companies issuing such insurance policies shall give the City at least thirty (30) days written notice in the event of cancellation of, or material change in, any of the policies. If the coverage on said certificate(s) is shown to expire prior to completion of all terms of this Contract, the Contractor shall furnish a certificate of insurance evidencing renewal of such coverage to the City. The certificates of insurance shall clearly show this Contract number. To the extent possible depending on the type of coverage required, City shall be named as an additional named insured on all such certificates of insurance.

6. Subcontractor's Insurance

The Contractor shall require each of his Subcontractors to take out and maintain during the life of his subcontract the same insurance coverage required of the Contractor under Paragraphs 2A, 2B, and 3 above, including the extension of coverage required under Paragraph 2B, Subparagraphs 1 and 2 above. Each Subcontractor shall furnish to the Contractor two (2) copies of a certificate of insurance, and such certificate shall contain the same information required in Paragraph 4 above. The Contractor shall furnish one copy of the certificate to the City.

7. Insurance Company

All insurance policies herein required of the Contractor shall be written by a company duly authorized to do business in the State of Nebraska. Minimum AM Best's rating should be no less than A-VII

TECHNICAL SPECIFICATIONS
DIVISION I
GENERAL REQUIREMENTS

1. **Right-of-Way.** The City of Hastings, Nebraska, will provide the necessary right-of-way to construct all portions of the project.

2. **Preconstruction Conference.** A preconstruction conference will be held prior to beginning work on the project. Attendance at this conference by the Contractor or his representative and any subcontractors will be required.

3. **Time Limit and Liquidated Damages.** A Notice to Proceed will be issued by the Owner. Liquidated damages will be assessed against the Contractor at the rate as specified in the contract documents per working day for each day the work is uncompleted after the expiration of the working days specified.

4. **Construction Schedule and Progress of Work.** The Contractor shall submit a construction schedule to the Engineer prior to commencing work. The schedule shall reflect the Contractor's consideration of a minimum of inconvenience to the public.

   Any deviations from work scheduling or traffic detouring shall be first approved by the Engineer.

5. **Public Access.** The area under construction may be closed to vehicular traffic. Pedestrian traffic shall be maintained as provided in Paragraph 15 of this section. The Contractor shall be responsible for all barricades, warning signs, flagmen, etc. needed to protect the public as outlined in the "Nebraska Manual of Uniform Traffic Control Devices".

6. **Description of Work.** This Project may consist of excavation, storm sewer, curb inlets, pavement replacement, prepackaged riprap installation and pavement installation, together with necessary appurtenances and accessories as noted on the specific plans for work.

7. **Location of Work.** The location of the work to be performed is identified on the proposal and the title sheet of the plans for each project.

8. **Purchasing Agent Appointment and Exempt Sales Certificate.** The Contractor performing the work under this contract will be issued a "Purchasing Agent Appointment" and "Exempt Sales Certificate" signed by the authorized representative of the Owner. It is to be used by the Contractor when purchasing tangible personal property to be actually incorporated into the contract work.

9. **Occupational Safety and Health Act Requirement.** The General Contractor, sub-contractors and suppliers of materials shall comply fully with the provisions of the Occupational Safety and Health Act of 1970, following the effective date thereof, with regard to all work performed and/or materials supplied and shall establish safe and healthful working conditions for employees in connection with such work according to all occupational safety and health standards applicable thereto which are promulgated and issued by the Secretary of Labor during the time of performance of such work and shall indemnify and hold the City of Hastings and the Engineer harmless of and from any and all penalties, fines or expenses which may incur by reason of the violation by subcontractor or supplier of any of the terms and provisions of said Act or said standards.

10. **Excusable Delays.** The right of the Contractor to proceed shall not be terminated nor shall the Contractor be charged with liquidated damages for any delays in the completion of the work due to the following:

(a) To any acts of the Government, including controls or restrictions upon or requisitioning of materials, equipment, tools or labor by reason of war, National Defense or any other national emergency;

(b) To any act of the City;

(c) To causes not reasonably foreseeable by the parties to this contract at the time of the execution of the contract which are beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God or of the public enemy, acts of another contractor in the performance of some other contract with the City, fires, floods, epidemics, quarantine, restrictions, strikes, freight embargoes and weather of unusual severity such as hurricanes, tornadoes, cyclones and other extreme weather conditions; and

(d) To any delay of any subcontractor occasioned by any of the causes specified in subparagraphs (a), (b) and (c) of this paragraph 13.

Provided, however, that the contractor promptly notified the City within ten (10) days in writing of the cause of the delay. Upon receipt of such notification, the City shall ascertain the facts and the cause and extent of delay. If, upon the basis of the facts and the terms of this contract the delay is properly excusable, the City shall extend the time for completing the work for a period of time commensurate with the period of excusable delay.

11. **Schedule of Construction.** Within ten (10) days after award of the contract, the Contractor shall submit a written progress schedule for the Engineer's approval outlining the manner in which he proposes to prosecute the work. No revision of the approved schedule of work shall be accomplished without first being submitted to and approved by the Engineer.

12. **Obstructions.** The contract prices shall include the cost of removal of quicksand, hardpan, boulders, rubbish, unforeseen obstacles, underground conduits, gas pipes, drain tile, trees, roots, tracks, pavements, sidewalks and the delay or damage caused by the same, whether these obstacles are shown on the contract drawings or not.

13. **Cost of Service.** The Contractor will be required to pay the cost of all water, power, lighting and heating required during construction, and such costs should be merged in the contract price.

14. **Accommodation of Public Vehicular Traffic.**

(a) In order to maintain traffic and to facilitate the ingress and egress to properties and businesses located near or along the side of the project, it may be necessary to construct temporary driveways or temporary cross-overs. These locations may necessitate the placement of temporary surfacing to ensure the movement of traffic through these areas. The temporary cross-overs and the temporary surfacing shall be paid for at the contract unit price for each item of work involved as provided for elsewhere in this special provision. The locations of the temporary cross-overs and the temporary surfacing shall be as directed by the Engineer.

(b) The schedule of sequence of the various portions of the job shall be made available to the Engineer at the preconstruction conference. Any variations from these accommodations to traffic provisions must be approved by the Engineer.

(c) It shall be the responsibility of the Contractor to furnish a flagman or flagmen to direct traffic when his equipment is operating over or adjacent to the roadbed being used by the traveling public. He shall take any other steps necessary to ensure the orderly movement of traffic through or around the work at all times during the day or night, including Sundays and holidays.

(d) All slow-moving equipment used under "Traffic Maintained" conditions including, but not limited to, asphalt pavers, distributors, aggregate spreaders, rollers and mechanical brooms, but not including dump trucks, shall be equipped with at least one revolving amber emergency light (more will be acceptable). All such slow moving equipment shall also be equipped with the standard "slow-moving vehicle" emblem meeting the requirements of Article 7, Section 39-723-10, and R.R.S. 1943.

(e) Revolving amber emergency lights shall be provided with a minimum 50 candlepower bulb. Lights shall be sealed so as to be dust and water tight and shall be maintained in good operating condition at all times. Lights shall be level mounted on equipment and provide for 360 degree visibility on each revolution. All revolving lights used shall provide a light that is clearly visible day or night for a minimum distance of 800 feet. The use of magnetic mounted lights will be permissible provided that they meet requirements for visibility and level mounting as set forth above.

(f) Surfacing materials for detours, bypasses or crossings of the project shall be applied as shown in the plan or as directed by the Engineer. Measurement and payment for surfacing applied for accommodation of traffic will be made according to the Standard Specifications, special provisions or as "extra work" if not shown on the plans.

(g) Direct payment will not be made for the flagging service or for the work and materials, except as noted herein, that are incidental to the accommodation of traffic, but it shall be considered that all labor, equipment, materials (other than surfacing) and tools that are required in the work are subsidiary to the items for which the contract provides that direct payment be made, unless specific unit bid items are contained within the contract bid proposals or documents.

(h) It shall be the responsibility of the Contractor to provide and maintain all barricades necessary to close and/or divert traffic away from the streets where construction is taking place. All activities concerning placement of said barricades shall be coordinated with the Engineering Department.

15. **Existing Sanitary Sewer, Water and Existing Utilities Services.** Existing sanitary sewer and water service lines and mains shall be left in place, undisturbed and functioning, during installation of the storm sewer. The Contractor shall assume full responsibility to maintain continuous and uninterrupted service to users of the sewer and water system. The Contractor shall exercise every precaution to avoid damage to any existing utility line or appurtenance (including underground electrical and telephone cables) while performing his work, and he shall be held liable for any damage incurred as a result of his operations.

16. **Standard Water and Sewer Cast Iron Pipe** shall be Class 150, cement mortar lined or equal.

17. **Soils and Groundwater Conditions.** The successful Contractor shall be required to satisfy himself as to soils and groundwater conditions and will hold the Owner blameless for soils, rock, groundwater or other subsurface conditions encountered during construction of the project.

18. **Special Section.** The Contractor shall not order prefabricated special pipe sections, tees and manholes until order lengths have been verified in the field by the Engineer.

19. **Excess Excavation Disposal Sites.** All earth excavation shall be transported to a site as designated by the Engineer at the preconstruction conference.

In exercising every precaution, the Contractor will be required, among other things, to contact the owner of utilities in determining the exact location of all utilities in advance of his work. Location of utilities on the plans is approximate only, and telephone service lines are not shown.

20. **Maintenance of Surface Drainage and Storm Sewers.** During the course of construction, the Contractor shall conduct his operations in a manner that will not pond or divert surface drainage onto private property and shall maintain the existing surface drainage patterns until such time that the storm sewer system is operable. In addition, the Contractor shall provide temporary works construction which must be approved by the Engineer and shall remain in place until such time that the storm sewer system is operable. The work required for maintenance of surface drainage and storm sewers will not be paid for directly but shall be considered subsidiary to the bid items of the contract.

21. **Property Corners.** The Contractor shall protect existing property corners, and if disturbed or removed during the course of construction, he shall cause to have said corners replaced under the direction of a duly qualified Licensed Land Surveyor.

22. **Testing.** All materials will be inspected, tested and accepted by the Engineer before incorporated in the work. Any work in which untested and unaccepted materials are used without approval or written permission of the Engineer shall be performed at the Contractor's risk and may be considered as unacceptable and unauthorized and will not be paid for. Unless otherwise designated, tests in accordance with the most recent cited standard method of AASHO or ASTM, whichever are current on the date of advertisement, will be at the expense of the Contractor. All testing (concrete and subgrade) will be taken by the Engineer or a qualified representative of the Owner. The cost of concrete tests (compressive cylinder breaks) will be the responsibility of the Contractor. All materials being used are subject to inspection, test or rejection at any time prior to incorporation into the work. Copies of such tests will be furnished to the Contractor at his request.

23. **Miscellaneous Removal Items.** Items indicated for removal on the plans or in the specifications shall be stored at locations determined by the Engineer. Caution shall be exercised in the removal and storage of said items to ensure minimal damage to the article. Items which require removal and replacement shall be restored to equal condition prior to beginning of construction.

No separate measurement and payment will be made for removal and/or replacement of miscellaneous items, unless a separate bid item is included in the contract for such work. Said work not specifically identified in the bid items shall be considered subsidiary to the other bid items of the contract.

24. **Concrete Plugs** for storm sewer, collars and other miscellaneous items of work shall not be measured and paid for directly unless a separate bid item is included in the contract but shall be considered subsidiary to the bid items of the contract.

25. Concrete Mix Type.

(a) The concrete mix for P.C.C. Pavement, driveways and structural concrete shall be State of Nebraska 47B as specified in Section 1002 of the 2007 State of Nebraska specifications.

(b) The concrete mix for sidewalks shall be State of Nebraska Type BX as specified in Section 1002 of the 2007 State of Nebraska Specifications.

(c) All concrete shall have a minimum compressive strength of 2,000 psi at 7 days and 3,500 psi at 28 days unless otherwise noted in the plans and specifications.

26. Relaying of Storm Sewer Pipe shall be installed, measured and paid for in accordance with Section I of these specifications.

27. Stripping Topsoil.

(a) Description. This work shall consist of the removal of topsoil from cut areas or areas to be covered by embankments in such quantity as required to cover the slopes, ditches and shoulders in accordance with the details shown in the plans; subsequent placing, spreading and finishing of the topsoil material shall be as indicated in Section M "Topsoil, Seeding, Mulching, Fertilizing & Erosion Control."

(b) Construction Methods.

(1) Clearing and grubbing operations from the area from which the topsoil is to be obtained shall be completed prior to the removal of the topsoil.

(2) In the work of removing the topsoil, care shall be taken to avoid the incorporation of any appreciable quantities of subsoil.

(c) Measurement and Payment. Stripping will be measured and paid for at the contract unit price per cubic yard for "Stripping Topsoil", which payment shall be full compensation for furnishing all labor, equipment and materials necessary to complete the item of work, or as outlined in the Special Provisions.

28. Riprap.

(a) Description. This work shall consist of furnishing and placing riprap in accordance with the details shown in the plans or as directed by the Engineer.

(b) Materials. Riprap may consist of broken concrete of which at least 90 percent shall consist of pieces weighing not less than 50 pounds each. Pieces meeting this requirement shall be sound and free of fractures.

(c) Construction Method.

(1) The riprap shall be placed upon the slopes and ditch bottoms as indicated on the plans or as directed by the Engineer and shall be placed to a minimum depth of 12 inches in two layers.

(2) The riprap shall be placed to provide a uniform slope with a regular surface conforming to the lines and grades indicated on the plans or as directed by the Engineer.

(d) Measurement and Payment. Riprap will be measured and paid for at the contract unit price per square yard for "Riprap", which payment shall be full compensation for furnishing all labor, equipment and materials necessary to complete the item of work.

29. Prepackaged Riprap.

(a) Description. This work shall consist of furnishing and placing of commercially available, prepackaged riprap bags in accordance with the details shown in the plans or as directed by the Engineer.

(b) Materials. Material shall consist of prepackaged crushed concrete, stone, sand and gravel and cement in degradable bags as produced by U-Mix Products Co., 6200 Cornhusker Highway, P.O. Box 29288, Lincoln, Nebraska 68529, (402) 466-1953, or approved equal. Filled bag size is approximately 20 inches long by 13 inches wide by 4 inches thick.

(c) Construction Method. The standard building technique for a riprap wall is to stack the bags in a running bond pattern similar to brick or concrete block. The first row of bags should be placed side by side which forms a toe for the remainder of courses which are then placed end to end. Each course of bags should be overlapped in a step pattern which may vary from 2 inches to 8 inches dependent upon vertical wall conditions as indicated on the plans. When the riprap is used as a wall for reclamation or as a seawall, backfill should be used. The backfill shall be placed simultaneously with every other course of bags laid and shall be compacted to at least 90 percent proctor density. The course of bags shall be placed so as to follow the contour of the natural ground or excavation proposed and shall be flat and perpendicular to the base. The base course gradeline shall be established by laser and control points in the field. The bags shall be pinned together vertically with #4 rebar in accordance with the plan details illustrated. Since the bags are filled with a dry material which allows the bag to conform to the contours of the base and fill, they should be tamped or packed with a tamper or jitterbug to ensure proper bonding of each course as well as giving a flat surface for the following course of bags. This also fills the bags completely with material giving a physically uniform dimensional wall. Any variations in placement of the bags from the details illustrated on the plans will be instructed by the Engineer in the field.

(d) Measurement and Payment. Prepackaged, bagged riprap will be measured and paid for at the contract unit price per bag, which payment shall be full compensation for furnishing all labor, equipment and materials necessary to complete the item of work.

Reinforcing steel for pinning bagged, prepackaged riprap shall be paid for at the unit bid price per pound, which payment shall be full compensation for furnishing all labor, equipment and materials necessary to complete the item of work.

30. **Water.** The Owner will provide access to the Contractor of any and all water necessary to construct the proposed project. The water will be furnished from the fire hydrant nearest the project. It will be the responsibility of the Contractor to contact Hastings Utilities before use of any fire hydrant. Hastings Utilities will, upon deposit from the Contractor, furnish and install a meter, checkvalve and shut-off for the Contractor's use. The Contractor shall furnish all other necessary hose adaptors, hose and other equipment for the distribution and transportation of the water and shall be responsible for water usage fees.

31. **Opening Pavement for Use.** No section of pavement shall be opened to traffic until approval has been given by the Engineer.

At the option of the Engineer, certain sections of the project may be opened to traffic. In such cases, the section will be inspected, completed work tentatively accepted in writing at the discretion of the Engineer and the same turned over to the City for maintenance. Such action shall not in any way be construed as a final acceptance of the project.

The Contractor will not be held responsible for damages to portions of the project which have been tentatively accepted by the Engineer and opened to traffic prior to final approval and acceptance of the project, provided such damages are due to actions of the elements or to normal action of traffic. The Contractor shall be responsible for any damages which may have been occasioned by defective work or because of noncompliance with the Plans, Specifications and Contract.

Upon written authorization by the Engineer, the Contractor may cease to maintain barriers and lights as required; the project may be opened to traffic; and the Contractor is relieved from further maintenance and public liability on that portion of the project, providing all of his equipment has been removed from the right-of-way.

32. **Landfill Fees.** The Contractor will be responsible for securing his own disposal site or paying any associated fees for disposal at the Landfill.

33. **Salvage Rights.** The City of Hastings will retain the right to salvage any paving brick that it may wish for its use in other projects.

DIVISION II
SITEWORK

SECTION A-CLEARING AND GRUBBING

1. **Description**. The work of clearing and grubbing shall be as described in Section 202 of the 2007 State Specifications.

2. **Construction Methods** used for clearing and grubbing shall be in conformance with Section 202.02.

3. **Method of Measurement and Payment.**

   (a) Clearing and grubbing of trees shall be measured and paid for as described in Section 202.01

   (b) General clearing and grubbing shall not be measured and paid for directly but shall be paid as a lump sum in accordance with Section 202.01.

SECTION B-EARTHWORK

1. **Description.** The work of performing Roadway Excavation and Embankment shall consist of that described in Section 205 of the 2007 State Specifications.

2. **Construction Methods used** shall conform to applicable portions of Sections 205.02 and 204.03. The compaction of embankments and fill shall be Class III Type C.

3. **Method of Measurement and Payment.** Unless specified in the plans or bidding documents, roadway excavation, embankments, watering, borrow or haul will not be paid for directly but shall be considered subsidiary to the bid items of the contract.

SECTION C-FOUNDATION COURSE

1. **Description.** This work shall consist of the construction of a compacted foundation course in accordance with Section 307 of the 2007 State Specifications.

2. **Subgrade** shall be prepared in accordance with Section 301, Subgrade Compaction, of the 2007 State Specifications.

3. **Materials.** All materials shall consist of that required to produce Aggregate Foundation Course (regular) as indicated in Section 307.02.

4. **Construction Methods.** Foundation Course shall be mixed, laid and compacted in accordance with Section 307.03 at locations designated on the plans or as directed by the Engineer.

5. **Measurement and Payment.**

   (a) All materials and work required to produce, mix, lay, water and compact Foundation Course (regular) will be measured and paid for on a square yard basis and shall be considered full compensation for producing, furnishing, laying, watering and compacting and all work necessary to complete the item of work.

   (b) Subgrade preparation shall not be paid for directly but shall be considered subsidiary to the bid items of the contract.

SECTION D-ASPHALTIC CONCRETE

RANGE FOR TARGET VALUES (1/2" Gradation Band)

SIEVE SIZE	PASSING PERCENT	
	Min.	Max.
I inch	100	
3/4 inch	98	100
1/2 inch	94	100
3/8 inch	80	98
No.4	52	88
No. 10	32	70
No. 30	17	38
No. 50	10	24
No. 200	3	7

SECTION E-PERFORMANCE GRADED BINDER

As per current NDOR Specifications.

SUPERPAVE ASPHALTIC CONCRETE

Section 1028 in the Standard Specifications is amended to provide that Asphaltic Concrete, Type SPR shall use the ½" gradation band.

SECTION 1028 - SUPERPAVE ASPHALTIC CONCRETE (J-7-0213)

Section 1028 in the Standard Specifications is void and superseded by the following:

1028.01 -- Description

1. a. Superpave Asphaltic Concrete is a Contractor-designed mix.

   b. The Contractor shall be required to define properties using a gyratory compactor that has met the Superpave evaluation test procedures, during mix design and production.

2. Job Mix Formula

   a. Before production of asphaltic concrete, the Contractor shall submit, in writing, a tentative Job Mix Formula (JMF) on the NDOR Mix Design Submittal Form for verification to the Department.

   b. The JMF shall be determined from a mix design for each mixture. A volumetric mixture design in accordance with AASHTO R 35 as modified within this specification will be required. However, the mixture for the Superpave specimens and maximum specific gravity mixture shall be aged for two hours at compaction temperature. The mixture shall be prepared using the following:

      (1) Mixture Conditioning of Hot Mix Asphalt (HMA), AASHTO R 30.

      (2) Method for Preparing and Determining the Density of Hot Mix Asphalt Specimens by Means of the SHRP Gyratory Compactor, AASHTO T312.

   c. The JMF shall identify:

      (1) The virgin mineral aggregates and pit locations

      (2) Recycled Asphalt Pavement (RAP) and source locations

      (3) Hydrated lime

      (4) Mineral filler

      (5) The percent passing value for each specified sieve for the individual and blended materials

   d. (1) The Contractor shall submit one uncoated, proportioned 22 lb. (10,000 gram) sample of the blended mineral aggregates for consensus properties and specific gravity testing, for all mix types

except SPS. Once verified, the Contractor may begin plant production and QC testing with the QA/QC program.

(2) The Contractor has the option of submitting the following; 2 proportioned 22 lb. (10,000 gram) samples of the blended mineral aggregates (which are pre-coated with hydrated lime) and two one-quart (liter) samples of the proposed PG Binder to be used in the mixture to the Department Materials and Research Central Laboratory at least 15 NDR working days before production of asphaltic concrete. If submitted these samples will be used to verify the Contractor's Superpave mix design test results and mix properties.

(3) Submitted with these samples shall be a copy of the Contractor's results for all Superpave mix design tests.

(4) Mix design shall include at a minimum:

(i) The bulk specific gravity (Gsb), which shall be 2.585, for data purposes and as information only, for all mixes.

(ii) The target binder content. The binder content will be determined by ignition oven results. A correction factor of 0.3% will be added to the ignition oven results for mixes containing hydrated lime.

(iii) The supplier and grade of PG Binder.

(iv) The maximum specific gravity of the combined mixture (Rice).

(v) The bulk specific gravity (Gmb) and air voids at N initial (Nini), N design (Ndes) and N maximum (Nmax) of the gyratory compacted specimens.

(vi) Voids in the Mineral Aggregate (VMA) and Voids Filled with Asphalt (VFA) at Ndes.

(vii) Fine Aggregate Angularity (FAA) and specific gravity, Coarse Aggregate Angularity (CAA), Flat and Elongated Particles and Sand Equivalent of the aggregate blend.

(viii) Location description and/or legal descriptions and producers of materials used in the mix.

(ix) Dust to Binder Ratio.

(x) JMF compaction temperatures from NDOR Gyratory Temperature Table (See Table 1028.11).

(xi) The hydrated lime content.

3. Quality Control Program:

a. The Contractor shall establish, provide, and maintain an effective Quality Control (QC) Program. The QC Program shall detail the methods and procedures that will be taken to assure that all materials and completed construction conforms to all contract requirements.

b. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the contract, the Contractor shall assume full responsibility for placing a pavement course that meets the target field values.

c. The Contractor shall establish a necessary level of control that will:

(1) Adequately provide for the production of acceptable quality materials.

(2) Provide sufficient information to assure both the Contractor and the Engineer that the specification requirements can be met.

d. (1) The Contractor shall develop and submit a copy of their QC Program to the Department. A copy of the QC Program shall be kept on file in the QC lab trailer. This Program shall be updated as needed and submitted annually for review.

(2) The Contractor shall not begin any construction or production of materials without an approved QC Program.

e. The QC Program shall address, as a minimum, the following items:

(1) QC organization chart.

(2) Inspection requirements.

(i) Equipment.

(ii) Asphalt concrete production.

(iii) Asphalt concrete placement.

(3) QC testing plan.

(4) Documentation of QC activities.

(5) Requirements for corrective action when QC or acceptance criteria are not met.

(6) Any additional elements deemed necessary.

(7) A list, with the name and manufacturers model number, for all test equipment used during laboratory testing.

(8) A description of maintenance and calibration procedures, including the frequency that the procedures are performed.

f. The QC organization chart shall consist of the following personnel:

(1) A Program Administrator:

(i) The Program Administrator shall be a full-time employee of the Contractor or a Subcontractor (Consultant) hired by the Contractor.

(ii) The Program Administrator shall have a minimum of 5 years' experience in highway construction.

(iii) The Program Administrator need not be on the job site at all times but shall have full authority to institute any and all actions necessary for the successful implementation of the QC Program.

(iv) The Program Administrator's qualifications and training shall be described in the QC Program.

(2) Quality Control Technicians:

(i) The quality control technicians shall report directly to the Program Administrator and shall perform all sampling and quality control tests as required by the contract.

(ii) The QC technicians shall be certified every 5 years by the Department Materials and Research Division.

(iii) Certification at an equivalent level by a state or nationally recognized organization may be acceptable.

(iv) The QC technician's credentials and training records shall be submitted to the Department.

(v) The Contractor may have a non-certified technician working under the direct supervision of a certified technician for no more than one construction season.

g. (1) Inspections shall be performed daily to ensure continuing compliance with contract requirements until completion of the work.

(2) QC test results and periodic inspections shall be used to ensure the mix quality and to adjust and control mix proportioning.

4. Contractor's Lab Equipment:

a. The Contractor shall calibrate and correlate the testing equipment according to the procedures prescribed for the individual tests and conduct tests in conformance with specified testing procedures.

b. The Contractor shall have the following equipment (or approved equal) at or near the project location:

(1) A gyratory compactor and molds meeting AASHTO criteria.

(2) An Asphalt Content Ignition Oven meeting AASHTO criteria.

(3) Rice equipment specified in AASHTO T 209, procedure 9.5.1, Weighing in Water. The thermometer being used to measure water temperature will be as specified in T 209.

(4) FAA equipment specified in AASHTO T304.

(5) To test density of compacted asphaltic concrete, a minimum 6000 gm balance, 0.1 gm resolution, with under body connect and water container large enough to conveniently place specimen in the basket and completely submerge the basket and specimen without touching the sides or bottom is required.

(6) QC Laboratory which contain the following:

Air conditioner.

Dedicated phone.

FAX machine or email.

Photocopy machine.

Sample storage.

Work table.

Bulletin board.

Running water.

Desk and chair.

Separate power supply.

Incidental spoons, trowels, pans, pails.

(7) Diamond saw for cutting cores.

(8) Diamond core drill minimum 3 inch (75 mm).

(9) Oven, 347°F (175°C) minimum, sensitive plus 5°F (plus 2°C).

(10) USA Standard Series Sieves for coarse and fine aggregate with appropriate shakers (12 inch (300 mm) recommended).

(11) Personal Computer capable of running the latest version of Department Superpave software, creating an electronic copy of the data, and printing to a Color Printer.

5. QC Testing Plan:

a. The testing plan shall provide that the samples be collected in accordance with the Department statistically based procedure of random sampling.

b. The Contractor may add any tests necessary to adequately control production.

c. All QC test results shall be reported on the latest version of the Department's provided Superpave software by the Contractor with a copy provided to the Engineer within 1 week after the tests are complete. Daily review by the Engineer shall be allowed. At the completion of the asphalt production, the Contractor shall submit to the Department a final copy of the Superpave test results on electronic recording media (CD, e-mail, flash drive, etc.).

d. Corrective Action Requirements:

(1) The Contractor shall establish and utilize QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

(2) The Contractor's QC Program shall detail how the results of QC inspections and tests will be used to determine the need for corrective action.

(3) (i) A clear set of rules to determine when a process is out of control and the type of correction to be taken to regain process control will be provided.

(ii) As a minimum, the plan shall address the corrective actions that will be taken when measurements of the

following items or conditions relating to the mixture approach the specification limits:

(I) Plant produced mix gradations at laydown (See gradation tolerances).

(II) Binder content.

(III) Air voids.

(IV) VMA (mix design only).

(V) VFA (mix design only).

(VI) FAAAASHTO T 304.

CAA ASTM D 5821.

(VII) Dust to Binder Ratio.

(VIII) Density.

(IX) Contaminates.

(iii) Corrective actions that will be taken when the following conditions occur:

(I) Rutting.

(II)Segregation.

(III) Surface voids.

(IV) Tearing.

(V) Irregular surface.

(VI) Low Density.

1028.02 -- Material Characteristics

1. The type of PG Binder will be shown in the contract.
2. Recycled Asphalt Pavement:
   a. The Contractor may submit to the State a proposal to supplement the virgin aggregates of the asphaltic concrete mix with a Contractor's specified percentage of Recycled Asphalt Pavement (RAP). The Contractor is responsible for investigating and maintaining the quality and verifying the quantity of the RAP material.
   b. In recycled asphaltic concrete mixtures, the allowable percent of RAP will be as shown in Table 1028.01.

Table 1028.01

Asphaltic Concrete Type	Percent, RAP	
	Minimum	Maximum
SPS	0	50
SPR	0	50
SPH	0	35

3. Aggregates:

a. Aggregates for use in superpave asphaltic concrete shall be tested on an individual basis.

b. With the exception of Asphaltic Concrete Type SPS the blended mineral aggregate shall not contain more than 80% limestone on the final surface lift of asphaltic concrete.

c. Asphaltic Concrete Type SPR may contain a total maximum of 10% of the virgin material that is composed of natural, uncrushed aggregate by manmade methods commonly known as but not limited to: 47B gravel, 2A gravel, gravel surfacing, sluice sand, blow sand, waste sand, fill sand, road gravel, roofing gravel, hot mix sand or gravel, coarse sand, fine sand, plaster sand, masonary sand, pit run sand or gravel. For clarification on any proposed gravel, contact the Department Flexible Pavements Engineer.

d. Chat or coal sand will not be allowed in any mix.

e. Crushed rock material for use in asphaltic concrete, 1/4 inch (6.35 mm) and smaller, screenings and manufactured sand shall have a Sodium Sulfate loss of not more than 12% by mass at the end of 5 cycles. Sampling size and frequency shall adhere to the current Department Materials Sampling Guide.

f. Quartzite and granite shall conform to the requirements of Subsection 1033.02, Paragraph 4, a. (8). Sampling size and frequency shall adhere to the current Department Materials Sampling Guide.

g. Crushed rock (Limestone) and Dolomite shall conform to the requirements of Paragraph 4.a. (4), (5) and (6). of Subsection 1033.02 of the Standard Specifications. Sampling size and frequency shall adhere to the current Department Materials Sampling Guide.

h. Soundness tests shall not be required for fine sand.

i. Once the satisfactory quality of aggregates from a source has been established, sufficient additional soundness tests will be performed to insure the continued satisfactory quality of the material, as determined by the Materials Sampling Guide

j. Aggregate consensus properties may be performed on material prior to the application of hydrated lime.

k. The coarse aggregate angularity value of the blended aggregate material shall meet or exceed the minimum values for the appropriate asphaltic concrete type as shown in Table 1028.02. If the coarse portion of the blend is all ledge rock the CAA tests may be waived.

Table 1028.02
Coarse Aggregate Angularity
(ASTM D 5821)

Asphaltic Concrete Type	CAA (minimum)
SPS	--
SPR	83
SPH	95/90*

* Denotes two faced crushed requirements

l. The fine aggregate angularity value of the blended aggregate material shall meet or exceed the minimum values for the appropriate asphaltic concrete type as shown in Table 1028.03.

m. The specific gravity for calculation of the Fine Aggregate Angularity (FAA) shall be determined on a washed combined aggregate sample of the material passing the No. 8 (2.36 mm) sieve and retained on the No. 100 (150 µm) sieve. The Contractor will determine the specific gravity to be used in the calculation of FAA mixture design value(s) and, if verified by the Department Aggregate Laboratory, this same value can be used throughout production. The verification value determined by the Department Aggregate Laboratory will be on a combined aggregate sample supplied by the Contractor that is representative of the material proposed or being used during production. The specific gravity to be used throughout production to calculate FAA values will be the Contractor's verified value or the Department determined value (whenever verification is not made) and will be noted on the Mix Design. Changes in aggregate percentages during production may require determination of a revised specific gravity for FAA.

Table 1028.03
Fine Aggregate Angularity
(AASHTO T304 Method A)

Asphaltic Concrete Type	FAA (minimum)
SPS	--
SPR	43.0
SPH	45.0

n. The coarse aggregate shall not contain flat and elongated particles exceeding the maximum value for the appropriate asphaltic concrete type category shown in these provisions according to Table 1028.04.

Table 1028.04
Flat and Elongated Particles*
(ASTM D 4791)

Asphaltic Concrete Type	Percent, Maximum
SPS	25
SPR	10
SPH	10

*Criterion based on a 5:1 maximum to minimum ratio.

o. The sand equivalent of the blended aggregate material from the fine and coarse aggregates shall meet or exceed the minimum values for the appropriate asphaltic concrete type shown in these provisions according to Table 1028.05.

Table 1028.05
Sand Equivalent Criteria
(AASHTO T 176)

Asphaltic Concrete Type	Sand Equivalent, Minimum
SPS	30
SPR	45
SPH	45

p. Dust to binder ratio is the ratio of the percentage by weight of aggregate finer than the No. 200 (75 µm) sieve to the asphalt content expressed as a percent by weight of total mix. The dust to binder ratio shall be within 0.70 and 1.70.

q. The blended aggregate shall conform to the gradation requirements specified in Table 1028.06 and Table 1028.07 for the appropriate nominal size.

Table 1028.06
Gradation Control Points for 0.75 Inch (19 mm) and 0.5 Inch (12.5 mm) Nominal Size

	0.75 Inch (19 mm) Control Points (percent passing)		0.5 Inch (12.5 mm) Control Points (percent passing)	
English Sieve (Metric)	**Minimum**	**Maximum**	**Minimum**	**Maximum**
1 inch (25 mm)	100.0			
3/4 inch (19 mm)	90.0	100.0	100.0	
1/2 inch (12.5 mm)		90.0	90.0	100.0
3/8 inch (9.5 mm)				90.0
No. 8 (2.36 mm)	23.0	49.0	28.0	58.0
No. 16 (1.18 mm)				
No. 30 (600 μm)				
No. 50 (300 μm)				
No. 200 (75 μm)	2.0	8.0	2.0	10.0

Table 1028.07
Gradation Control Points for 0.375 Inch (9.5 mm) Nominal Size and SPR

	0.375 Inch (9.5 mm) Control Points (percent passing)		SPR Control Points (percent passing)		SPR (Fine) Control Points (percent passing)	
English Sieve (Metric)	**Minimum**	**Maximum**	**Minimum**	**Maximum**	**Minimum**	**Maximum**
3/4 inch (19 mm)			98.0	100.0		
1/2 inch (12.5 mm)	100.0					
3/8 inch (9.5 mm)	90.0	100.0	81.0	89.0	81.0	96.0
No. 4 (4.75 mm)		90.0				
No. 8 (2.36 mm)	32.0.	67.0	46.0	56.0	46.0	56.0
No. 16 (1.18 mm)						
No. 30 (600 μm)						
No. 50 (300 μm)			12.0	21.0	12.0	21.0
No. 200 (75 μm)	2.0	10.0	4.0	9.0	4.0	9.0

r. The combined mineral aggregate for Asphaltic Concrete, Type SPS, shall be an aggregate or a combination of aggregates, and mineral filler if needed, that conforms to the gradation requirements specified in Table 1028.08.

Table 1028.08
Gradation Control Points for Type SPS

	Control Points (percent passing)	
English Sieve (Metric)	**Minimum**	**Maximum**
1 inch (25 mm)	100.0	
¾ inch (19 mm)	94.0	100.0
½ inch (12.5 mm)	81.0	100.0
No. 4 (4.75 mm)	70.0	90.0
No. 8 (2.36 mm)	42.0	70.0
No. 16 (1.18 mm)	29.0	43.0
No. 30 (600 μm)	19.0	34.0
No. 50 (300 μm)	11.0	20.0
No. 200 (75 μm)	2.0	10.0

s. Mineral filler shall consist of pulverized soil, pulverized crushed rock, broken stone, gravel, sand-gravel, sand or a mixture of these materials that conforms to the requirements in Table 1028.09.

Table 1028.09
Mineral Filler for Type SPS

	Min.	Max.
Total Percent Passing the No. 50 (300 μm) Sieve	95	100
Total Percent Passing the No. 200 (75 μm) Sieve	80	100
Plasticity Index (material passing the No. 200 (75 μm) Sieve, except soil	0	3
Plasticity Index for Soil	0	6

1028.03 -- Acceptance Requirements

1. Mix Criteria:

   a. The target value for the air voids of the SPH Asphaltic Concrete shall be 4% (±1%) at the Ndes number of gyrations. For Type SPS Asphaltic Concrete the air voids at Ndes shall be a minimum of 1.5% with a maximum of 5.0%. For Type SPR Asphaltic Concrete the air voids shall be 3% (±1%) at the Ndes number of gyrations.

   b. The design criteria for each mixture shall be determined from Tables 1028.10, 1028.11, and 1028.12.

Table 1028.10
Gyratory Compaction Effort
(Average Design High Air Temperature <39 degrees C)

Asphaltic Concrete Type	Nini	Ndes	Nmax
SPS	6	40	62
SPR	7	65	100
SPH	8	95	150

Table 1028.11
Gyratory Compaction Temperatures

Mix Type	% RAP	Compaction Temp °F
SPS	0-25	270 ± 5
	26-50	280 ± 5
SPR	0-35	280 ± 5
	36-50	290 ± 5
SPH	0-35	300 ± 5

Table 1028.12
Minimum Binder Content

Mix Type (Metric)	Minimum Binder Content, Percent
SPS	4.8
SPR	5.0
3/8 inch (9.5 mm)	5.5
1/2 inch (12.5 mm)	5.1
3/4 inch (19 mm)	5.0

c. During production of Lot #1, the Contractor shall provide to the Department 6 properly prepared gyratory samples for AASHTO T 283 testing for all mixtures. Superpave mixtures shall contain 1.25% hydrated lime as specified in the Special Provision "Hydrated Lime for Asphaltic Mixtures". Each Superpave mixture shall be tested for moisture sensitivity in accordance with AASHTO T 283. The 6 inch (150 mm) specimens shall be compacted in accordance with AASHTO T 312 to 7% (± 0.5%) air voids at 95 mm in height and evaluated to determine the Tensile Strength Ratio (TSR).

d. During production of Lot #1, the Contractor shall provide to the Department two 75mm gyratory puck samples at 4.0% voids (± 0.5%) for APA testing for all mixtures except Asphaltic Concrete Type SPS.

2. The Contractor shall make Mix adjustments when:

   a. The mix does not meet the current approved JMF or any other requirements of the contract.

   b. Surface voids create a surface or texture that does not meet the criteria of Sections 502 and 503 in these Standard Specifications.

   c. Rutting occurs.

3. The Contractor shall inform the Engineer when changes in mixture properties or materials used occur for any reason. Changes such as, but not limited to, types or sources of aggregates or changes in grades, sources, properties or modification procedures (if modified) of PG Binders. The Department may require a new job mix formula, mix design and moisture sensitivity test. The new proposed job mix formula shall be in accordance with the requirements as stated above.

4. Mix adjustments at the plant are authorized within the limits shown in Table 1028.13 as follows:

   a. The adjustment must produce a mix with the percent air voids and all other properties as stated in these specifications.

   b. All adjustments must be reported to the Engineer.

   c. The adjustment values in Table 1028.13 will be the tolerances allowed for adjustments from the Department verified mix design "Combined Gradation" target values which resulted from production or mix design adjustments, but cannot deviate from Superpave gradation criteria. Mix adjustments for individual aggregates, including RAP, greater than 25% of the original verified mix design proportion or greater than 5% change in the original verified mix design percentage, whichever is greater, may require the Contractor to submit a new mix design, as determined by the Engineer. The Contractor is responsible for requesting new mix design targets as they approach these tolerances, failure to do so may result in a suspension of operations until a new mix design is approved.

Table 1028.13

Aggregate Adjustments	
Sieve Size	**Adjustments**
1 inch (25 mm), 3/4 inch (19 mm), 1/2 inch (12.5 mm), 3/8 inch (9.5 mm), No. 4 (4.75 mm)	± 6%
No. 8 (2.36 mm), No. 16 (1.18 mm), No. 30 (600 µm), No. 50 (300 µm)	± 5%
No. 200 (75 µm)	± 2%

5. Sampling and Testing:

a. The Contractor shall take samples at frequencies identified by the Engineer, according to the Department statistically based procedure. The samples shall be approximately 75 lbs (34 kg) and split according to AASHTO T-248 to create a companion sample. This sample splitting can be either at: 1) the sampling location, with the Department taking custody of their sample at that time or 2) after being transported to the test facility in an insulated container, with the Department taking custody of their sample at that time as determined by the Engineer. The details of sampling, location, splitting etc. shall be determined at the pre-construction conference.

b. All samples transported to the test facility and companion samples within the Lot shall be identified by attaching or faxing the lab calculation sheet from the latest version of the superpave software, stored, and retained by the Contractor until the Department has completed the verification testing process. Transporting of all samples will be under the observation of Department.

c. (1) The sample shall be taken from the roadway, behind the paver before compaction or from the windrow. For SPS mixes, the Contractor has the option to obtain the samples directly at the plant.

(2) At least one QC sample shall be tested for every 750 tons (680 Mg) of plant produced mix.

(i) If, at the completion of the project, the final lot consists of less than 3,750 tons (3,400 Mg) of asphaltic concrete, 1 sample for each 750 tons (680 Mg) or fraction thereof, shall be taken and tested.

(3) Additional sampling and testing for the Contractor's information and quality control may be performed at the Contractor's discretion. Any additional testing will not be used in pay factor determination.

(4) (i) When cold feed samples are being taken, the acquisition shall be timed such that the material in the sample represents, as close as possible, the same material in the sample taken behind the paver. If cold feeds are sampled and tested by Contractor, a split of that sample must be submitted with the hot mix sublot sample. The Contractor will be notified what sublot (a minimum of 1 sublot per lot) sample must be tested for FAA and CAA from the blended cold feed material according to the Department random sampling schedule. All other FAA and CAA sublot samples may be taken from the randomly selected portion of the blended cold feed material or obtained from the random samples taken behind the paver. Samples shall be taken under the observation of Department and split according to AASHTO T-248, with the Department taking custody of their sample at that time.

(ii) For projects using RAP material the FAA shall be established as follows: a RAP sample will be processed through an ignition oven

and then combined with the proportioned amount of virgin aggregate defined by the mix design and then proceeding with FAA and CAA testing.

d. The sample shall be compacted immediately while still hot (additional heating may be required to raise the temperature of the sample to compaction temperature).

e. Each production sample shall be tested as follows:

(1) Bulk Specific Gravity (Gmb) shall be determined for each specimen in accordance with AASHTO T 166 Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface Dry Specimens. One specimen shall be compacted for each production sample.

(2) One Theoretical Maximum Specific Gravity (Gmm) test for each production sample of uncompacted mixture shall be determined in accordance with AASTHO T 209 procedure 9.5.1. Weight in water - Maximum Specific Gravity of Bituminous Paving Mixtures.

(3) (i) The Blended Aggregate Bulk Specific Gravity (Gsb) shall be 2.585 for information only for all mixes.

(ii) FAA - AASHTO T 304 Method A. The pour time of the test sample into the funnel shall be completed in 5±1 seconds.

(iii) CAA - ASTM 5821. For SPR mixes, CAA testing and results are only required on the cold feed verification test for the lot.

(4) The laboratory air voids shall be determined in accordance with the following:

Table 1028.14

Gmb(corr)@Nany = Gmb(meas)@Nmax x (height@Nmax ÷ height@Nany)
%Gmm(corr)@Nany = 100 x (Gmb(corr)@Nany ÷ Gmm(meas))
% Air Voids@Nany = 100 - %Gmm(corr)@Nany
VMA@Ndes = 100 – (Gmb(corr)@Ndes x Ps ÷ Gsb)
VFA@Ndes = 100 x ((VMA@Ndes - % Air Voids@Ndes) ÷ VMA@Ndes)
Measured = (meas)
Corrected = (corr)

(5) (i) The percent of PG Binder shall be determined for each QC test. The percent of PG Binder will be computed by ignition oven results. A correction factor of 0.3% will be added to the ignition oven results for mixes containing hydrated lime.

(ii) The gradations shall be determined for each QC test using AASHTO T 30.

(6) Except as noted in this Subsection, all sampling and testing shall be done as prescribed in the Department Materials Sampling Guide and Standard Method of Tests.

f. Testing Documentation:

(1) All test results and calculations shall be recorded and documented on data sheets using the latest version of Department provided "Superpave" software. A copy containing complete project documentation will be provided to the Department at the completion of asphalt production.

g. Superpave Software:

(1) QC charts from the software shall be made available for review by the Engineer at any time.

(2) As a minimum, the following values shall be reported on Department provided software:

(i) Laboratory Gyratory density.

(ii) Ignition oven or cold feed aggregate gradations for all Superpave sieves will be reported.

(iii) PG Binder content shall be plotted to the nearest 0.01% by ignition oven results in accordance with AASHTO T 308.

(iv) The theoretical maximum specific gravity (Rice) to the nearest 0.001% will be reported.

(v) Laboratory Gyratory air voids at Ndes shall be plotted to nearest 0.1%. Laboratory Gyratory air voids, at Nini, Ndes and Nmax shall be reported to nearest 0.1%.

(vi) FAA and CAA of the asphaltic concrete for both cold feed and ignition oven samples will be reported to the nearest 0.1% for FAA and 1% for CAA. A minimum of one sublot FAA and CAA cold feed sample per lot will be tested and recorded on Department provided software.

(vii) VMA content shall be plotted to nearest 0.1% and VFA shall be reported to the nearest 0.1%.

(viii) Dust to Binder ratio to the nearest 0.01 will be reported.

6. Verification Sampling and Testing:

a. The Department will select and test at random one of the sublot samples (750 tons, 680 Mg) within a Lot (3750 tons, 3400 Mg) for verification and report results.

b. The results of Contractor QC testing will be verified by the Department's verification tests. Any samples outside of the tolerances in Table 1028.15 and 1028.16 will result in an Independent Assurance (IA) review of testing and may result in the Department test results being applied.

(1) On any given Lot, if the results of Air Void verification testing and its companion QC testing are within 1.0% air voids, the Air Void verification for the entire Lot is complete and the Contractor test results will be used to determine the pay factors. If the Air Void verification test results and the companion QC test results are outside the above tolerance, the results from the verification test will be used to determine the pay factor for that sublot. Any or all of the remaining four Department sublot samples may be tested and the Department sublot test results may be applied to the respective sublots and the resulting pay factors will apply.

(2) On any given Lot, if the results of the FAA verification testing and its companion QC testing are within 0.5 percent, the FAA verification for the entire Lot is complete and the Contractor test results will be used to determine the pay factor. If the FAA verification test results and the companion QC test results are outside the above tolerance, the results from the verification test will be used to determine the pay factor for that sublot. Any or all of the remaining four Department sublot samples may be tested and the Department sublot test results may be applied to the respective sublots and the resulting pay factors will apply.

c. When verification tests are within testing tolerance but results show a consistent pattern of deviation from the QC results, the Engineer may cease production and/or request additional verification testing or initiate a complete IA review.

Table 1028.15
Asphaltic Concrete Testing Tolerances

Test	Tolerance
Asphalt Content by Ignition Oven	0.5%
Gyratory Density	0.020
Maximum Specific Gravity	0.015
Bulk Dry Specific Gravity (Gsb)	0.020
FAA	0.5%
CAA	10%
Field Core Density	0.020
Air Voids	1.0%

Table 1028.16
Blended Aggregate Gradation
Testing Tolerances

Sieve Size	Tolerance
3/4 inch (19 mm), 1/2 inch (12.5 mm), 3/8 inch (9.5 mm), No. 4 (12.5 mm), No. 8 (2.36 mm)	5%
No. 16 (1.18 mm), No. 30 (600 µm), No. 50 (300 µm)	4%
No. 200 (75 µm)	2%

d. Independent Assurance (IA) Review of Testing:

(1) The Contractor shall allow the Department personnel access to their laboratory to conduct IA review of technician testing procedures and apparatus. Any deficiencies discovered in testing procedures will be reported by the department and corrected by the Contractor.

(2) During IA review, the Department personnel and the Contractor will split a sample for the purpose of IA testing. The samples selected will be tested in the Department Branch Laboratory. Any IA test results found to be outside of defined testing tolerances above will be reported. The Contractor shall verify the testing apparatus and make corrections if the apparatus is out of tolerance.

(3) See Section 28 of the Materials Sample Guide for more information on IA testing.

e. If the project personnel and the Contractor cannot reach agreement on the accuracy of the test results, the Department will be asked to resolve the dispute, which will be final. It is the Contractor's responsibility to obtain a large enough sample size for any referee testing (a total sample size of 6000 grams, to be retained by the Department after splitting, is recommended for FAA testing). All dispute resolutions will be in accordance with the Quality Assurance Program requirements in the NDOR Materials Sampling Guide.

7. Production Tolerances, Acceptance, and Pay Factors

Table 1028.17
Production Tolerances*

Test	***Allowable*** **Deviation from Specification**
Dust to Asphalt Ratio	None
Coarse Aggregate Angularity	- 5% below Min.
Fine Aggregate Angularity for SPR Only	- 0.2% below Min. for cold feed - 0.5% below Min. for ignition oven
Fine Aggregate Angularity for all other mixes	- 0.5% below Min. for cold feed - 1.0% below Min. for ignition oven
Minimum Binder Content	None

* These tolerances are applied to the mix design specification values, not the submitted mix design targets.

a. The Contractor shall notify the Engineer whenever a test result approaches the Specification limits.

b. When any single test result for FAA testing falls outside the allowable production tolerances in Table 1028.17, the material represented by this test will be accepted with a penalty as shown in Table 1028.18 or rejected, as determined by the Engineer. For all other tests, when any single test result, on the same mix property, from two consecutive QC samples fall outside the allowable production tolerances in Table 1028.17, the material represented by these tests will be accepted with a 20% penalty or rejected, as determined by the Engineer.

Table 1028.18
FAA Penalty Scale

Percentage outside of allowable deviation given in Table 1028.17	Penalty for SPR	Penalty for SPH
0.1%	20% or reject	5% or reject
0.2%	20% or reject	10% or reject
0.3%	20% or reject	15% or reject
0.4% or greater	20% or reject	20% or reject

c. The Contractor shall assume the responsibility to cease operations when specifications are not being met.

d. Acceptance and pay factors for Asphaltic Concrete Type SPS will be based on compacted in place average density.

e. For each sublot of Asphaltic Concrete Type SPR and SPH, the asphaltic concrete unit price is a product of all applicable pay factors for the item "Asphaltic Concrete, Type _____". Included in a sublot, following approval of the control strips, may be any roadway Asphaltic Concrete Type SPR or SPH which is produced and approved by the Engineer for use as Patching, State Maintenance Patching, and Asphalt for Intersections and Driveways on project shall be eligible for inclusion in sublot(s) tonnage pay factor determination using the roadway Asphaltic Concrete Type _____ unit price. When a control strip is not constructed, the pay factor for the running average of four air voids shall be fixed at 1.0 for the first three asphaltic concrete sublots.

(1) When there is a production tolerance pay factor penalty as stated in Paragraph 7.b. subsection 1028.03 this penalty percentage will be entered in the Superpave Asphalt Pay Factor Summary under production specifications for each sublot affected. These individual pay factors will then be multiplied by each other to determine a total pay factor for each sublot [(750 tons) (680 Mg)].

f. The pay factors for the single test air voids and moving average of four air voids pay factors will be determined in accordance with Table 1028.19.

Table 1028.19
Acceptance Schedule
Air Voids - N_{des}

Air voids test results for Asphaltic Concrete Type SPR	Air voids test results for SPH Asphaltic Concrete	Pay Factor	
		Moving average of four	Single test
Less than 0.5%	Less than 1.5%	50% or Reject	50% or Reject
0.5% to 0.9%	1.5% to 1.9%	50% or Reject	50%
1.0% to 1.4%	2.0% to 2.4%	50% or Reject	95%
1.5% to 1.9%	2.5% to 2.9%	90%	95%
2.0% to 2.4%	3.0% to 3.4%	100%	100%
2.5% to 3.5%	3.5% to 4.5%	102%	104%
3.6% to 4.0%	4.6% to 5.0%	100%	100%
4.1% to 4.5%	5.1% to 5.5%	95%	95%
4.6% to 5.0%	5.6% to 6.0%	90%	95%
5.1% to 5.5%	6.1% to 6.5%	50% or Reject	90%
5.6% to 6.0%	6.6% to 7.0%	50% or Reject	50%
6.1% and over	7.1% and over	50% or Reject	50% or Reject

8. Asphalt Concrete Density Samples:

a. The Contractor shall perform density tests under direct observation of Department personnel. The Contractor shall establish the method of testing in the preconstruction conference and shall test in accordance with the AASHTO T 166, NDR T 587, or as otherwise described in these Special Provisions. The Contractor shall insure that the proper adjustment bias and/or correction factors are used and accessible to Department personnel along with all other inputs when NDR T 587 is selected. All correlation factors and test results shall be generated and reported on the Department Density spreadsheet. When AASHTO T 166 is being used, the Department will observe the Contractor taking, transporting, and testing the cores. The Department will take immediate custody of the cores at the completion of the testing. All disputed values determined using NDR T 587 will be resolved using AASHTO T 166.

b. The Contractor shall determine the density of samples by comparing the specific gravity of the core sample to the Maximum Specific Gravity (Rice) as follows:

$$\% \text{ Density} = \frac{\text{Specific Gravity of Core}}{\text{Maximum Mix Specific Gravity Rice)}} \times 100$$

where:

$$\text{Sp. Gr. of Core} = \frac{\text{Wt. of Core in Air}}{\text{Wt. of SSD Core} - \text{Wt. of Core in Water}}$$

$$\text{Maximum Mix} \quad \frac{\text{Wt. of Mix in Air}}{}$$

Specific Gravity = (Rice) Wt. of Mix in Air - Wt. of Mix in Water

Note: The individual QC test value of the Maximum Mix Specific Gravity (Rice), determined by AASHTO T 209, will be used to calculate the density of each corresponding core.

c. The Contractor shall cut cores the first day of work following placement of the mixture. The core samples shall be a minimum of a 3 inch (75mm) diameter.

d. Normally, 1 sample for determination of density will be taken from each sublot (750 tons) (680 Mg) at locations determined by the Engineer.

e. The average density of the lot shall be used to compute the pay factor for density. Exceptions to the sampling and testing of core samples for the determination of density are as follows:

(1) When the nominal layer thickness is 1 inch (25 mm) or less, the sampling and testing of density for this layer will be waived.

(2) When the average thickness of the 5 cores for a lot is 1 inch (25 mm) or less, the testing of density samples for this lot will be waived.

(3) When the nominal layer thickness and the average of the original 5 cores for a lot are both more than 1 inch (25 mm), but some of the cores are less than 1 inch (25 mm) thick, additional cores shall be cut at randomly selected locations to provide 5 samples of more than 1 inch (25 mm) thickness for the determination of the pay factor for density.

f. (1) If, at the completion of the project, the final lot consists of less than 3,750 tons (3400 Mg) of asphaltic concrete, a minimum of 3 samples, or 1 sample for each 750 tons (680 Mg) or fraction thereof, whichever is greater, shall be taken and tested for density.

(2) The test results shall be averaged and the density pay factor based on the values shown in Table 1028.20.

(3) Should the average of less than 5 density tests indicate a pay factor less than 1.00, additional density samples to complete the set of five shall be taken at randomly selected locations and the density pay factor based on the average of the 5 tests.

Table 1028.20

Acceptance Schedule Density of Compacted Asphaltic Concrete	
Average Density (5 Samples, Percent of Voidless Density)	**Pay Factor**
Greater than 92.4	1.00
Greater than 91.9 to 92.4	0.95
Greater than 91.4 to 91.9	0.90
Greater than 90.9 to 91.4	0.85
Greater than 90.4 to 90.9	0.80
Greater than 89.9 to 90.4	0.70
89.9 or Less	0.40 or Reject

g. If requested by the Contractor, check tests for all density tests in the original set, taken no later than the working day following the receipt of all test results for the lot, will be allowed in lots with a density pay factor of less than 1.00. No re-rolling will be allowed in these lots. Locations for checks tests will be provided by the Engineer from the Random Sampling Schedule. The average density obtained by the check tests shall be used to establish the density pay factor for the lot.

h. The location of density samples are identified by the Random Sampling Schedule. When the random location is noted as zero or the lane width (i.e., zero or 12 ft. on a 12-foot lane), the core shall be cut with the outer edge of the core barrel no greater than 4 inches away (laterally) from the edge of the top of the mat for an unconfined edge or from the edge of the top of the hot mat (joint) for a confined edge. If using a nuclear gauge, the 4 inches would be measured to the edge of the gauge base. The percent density value at these edge-of-lane locations shall be adjusted upward by 2.5%, but to a value of no greater than 92.5%, and the resultant value used in determining the density pay factor. No initial value of 92.5 or greater shall be adjusted.

WARM MIX ASPHALT
(J-7-0213)

The Contractor has the option to use Warm Mix Asphalt (WMA) meeting the following requirements.

1. Warm Mix Asphalt (WMA)

Warm Mix Asphalt mixtures shall follow the requirements of Superpave Asphaltic Concrete and all other applicable sections with the following exceptions:

a. The Contractor shall request the use of a WMA additive in writing when submitting the Job Mix Formula. The requested additive shall be an approved Level I or II production product or combination thereof. The manufacturer's recommended additive rates, specifications, and all other pertinent information

shall be included in the requests. All requests must be approved by the Flexible Pavements Engineer prior to their use.

b. Level I Production

(1) Level I WMA additives are as follows: water injection devices.

(2) Hydrated Lime at 1.25% by weight of virgin aggregate is required for all mixtures.

(3) The allowable drop in temperature shall be a maximum of 40°F below the producer's recommended production temperature for Hot Mix Asphalt (HMA), or less as required during production to achieve proper laydown and compaction properties. Plant production temperatures shall not drop below 230°F.

c. Level II Production

(1) Level II WMA additives are as follows: Advera, Evotherm (DAT, ET, 3G), and Sasobit.

(2) For amine based WMA additives, 25% of the additive must be considered an amine based anti-striping agent. Amine based WMA additives with anti-striping agents shall be terminal blended by the binder supplier or a system approved by the Flexible Pavements Engineer for application at the plant. For all other warm mix technologies hydrated lime shall be added at a minimum rate of 1.25% by weight of virgin aggregate, including the weight of limestone. Hydrated Lime shall not be used on Level II WMA mixtures when the WMA additive is an Amine based additive or when the Amine WMA additives are used in combination with Level I water injection. The minimum rate for amine based WMA additives shall be 0.7%. The dosage rate of anti-strip shall not exceed manufacturer's recommendations.

(3) The drop in temperature shall be a maximum of 90°F from the producer's recommended production temperature for HMA. Plant production temperatures shall not drop below 215°F.

d. Other WMA additives shall not be used unless otherwise approved by the Flexible Pavements Engineer.

e. WMA additives may be used in combination by approval of the Flexible Pavements Engineer.

f. Asphalt mixes shall be tested for TSR on the first lot of production and then on randomly selected lots thereafter.

g. Field samples shall be heated and compacted using the following table unless otherwise approved by the Flexible Pavements Engineer.

Gyratory Compaction Temperatures

Mix Type	% Rap	Compaction Temp °F
SPS	0-25	270 ± 5
	26-50	280 ± 5
SPR	0-35	280 ± 5
	36-50	290 ± 5
SPH	0-35	300 ± 5

h. NDOR may suspend or eliminate the use of WMA on a project if any of the following conditions occur: rutting, segregation, surface voids, tearing, irregular surface, low density, raveling, stripping, or if pavement does not meet any other design criteria.

2. Warm Mix Asphalt (WMA) additives will be measured and paid for directly by the unit of each for the item "Hydrated Lime/Warm Mix Asphalt" for each ton of hot mix asphalt produced.

ASPHALT DENSITY GAUGE
(J-7-0213)

Description

An Asphalt Density Gauge may be used for Quality Control when determining the in-place density of asphaltic concrete.

Material Requirements

The device must be approved by the Flexible Pavements Engineer.

Testing Method

1. The Contractor shall establish the method of testing in the preconstruction conference. All testing shall be in accordance with AASHTO TP 68 and as directed in this provision.

2. The first 3 density locations of the project shall be cored in accordance with AASHTO T166 to calibrate the asphalt density gauge. Prior to coring, the Contractor shall calibrate the device at each core location.

3. Calibration: A correction factor shall be established for the first 3 cores by calculating the difference between the average density measurement of the asphalt density gauge and the roadway core density. This correction factor shall be entered into the device and used for measuring subsequent densities. The correction factor shall be verified with another core for every 15 density readings that are to be recorded.

4. Density Reading Procedure: Place the asphalt density gauge on the asphalt mat over the area to be tested. Record the density reading, and repeat this process for a total of 5 readings, as detailed in Figure 1. An average of the 5 readings will be used as the density reading for each location.

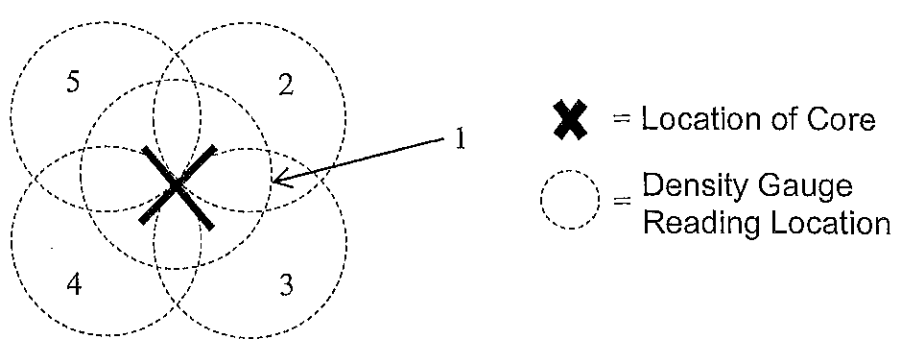


Figure 1: Asphalt density gauge

5. If any density measured by the asphalt density gauge is below 90%, a density core shall be cut at that location and used for density measurement for that sublot. Density readings below 90% shall not be used to calculate a correction factor. All disputed values determined using the asphalt density gauge will be resolved using AASHTO T 166.

ASPHALTIC CONCRETE TYPE SLX
(J-29-0414)

Asphaltic Concrete, Type SLX shall meet all of the requirements of Asphaltic Concrete, Type SPR, listed in Section 1028 and these Special Provisions, with the following exceptions:

1. Material Characteristics:

a. The type of PG Binder used shall be PG Binder 64-34 with 0.7% of an approved amine-based WMA additive.

b. Reclaimed Asphalt Pavement (RAP) will be added to the mix at a minimum of 20% and a maximum of 35%. The RAP must be fractionated/processed prior to use, to a sizing such that the combined hot mix meets the required gradation. The mat cannot exhibit any visual defects or cold spots from RAP conglomeration.

c. The mix shall contain a minimum of 20% Crushed Rock Chips (with a minimum of 45% retained on the #4 sieve and a maximum of 5% passing the #200 sieve).

d. The Asphaltic Concrete shall have a minimum Fine Aggregate Angularity (FAA) of 43.0 on the combined aggregate blend. There is no requirement for Coarse Aggregate Angularity (CAA).

e. Asphaltic Concrete Type SLX shall use the gradation band listed below.

Gradation Control Points for Type SLX

	Control Points (percent passing)	
English Sieve (Metric)	**Minimum**	**Maximum**
1/2 inch (12.5 mm)	98.0	100.0
3/8 inch (9.5 mm)	93.0	100.0
No. 4 (4.75 mm)	70.0	87.0
No. 8 (2.36 mm)	45.0	65.0
No. 16 (1.18 mm)	25.0	41.0
No. 30 (600 µm)	15.0	31.0
No. 50 (300 µm)	10.0	21.0
No. 100 (150 µm)	---	---
*No. 200 (75 µm)	4.0	10.0

* Dust to binder ratio is the ratio of the percentage by weight of aggregate finer than the No. 200 (75 µm) sieve to the asphalt content expressed as a percent by weight of total mix. The dust to binder ratio shall be between 0.70 and 1.70.

2. Design Criteria:

a. The optimum binder content shall be the binder content that produces 2.0 to 4.0 percent air voids at 50 gyrations, with a minimum content of 5.3%.

b. The Voids in the Mineral Aggregate (VMA) shall be a minimum of 16% ± 1% (mix design only).

3. Placing and Finishing:

a. Asphaltic Concrete shall be placed only when the ambient temperature is at least 40°F (4°C) and rising.

b. The asphaltic concrete temperature shall be 285° F (154°C) or above measured in the truck just prior to placement. Exceptions to this requirement are that the PG Binder Supplier recommended maximum temperature requirement shall not be exceeded.

c. The Contractor will use steel wheel compactors only. Rubber tire rollers will not be allowed.

4. Asphaltic Concrete Density:

Regardless of layer thickness, Asphaltic Concrete Type SLX will be monitored for density.

An initial rolling pattern test strip shall be completed to determine the rolling pattern that will target a minimum of 92.5% density. The Contractor shall monitor the density through a combination of rolling pattern and field testing as deemed necessary by the Engineer.

Method of Measurement:

For each lot of Asphaltic Concrete Type SLX, the asphaltic concrete shall be paid by the contract unit price for the item "Asphaltic Concrete, Type SLX". The asphaltic concrete unit price is a product of all applicable pay factors excluding density and CAA.

Basis of Payment:

Paragraphs 2.a., 2.b.(1), 2.b.(2) and 2.b.(3) of Subsection 503.06 are void and superseded by the following:

Asphaltic Concrete Type SLX shall be paid per ton (Mg) for the item "Asphaltic Concrete Type SLX".

SECTION F-PORTLAND CEMENT CONCRETE PAVEMENT, CURB WALL, INTEGRAL CURB, CURB AND GUTTER AND SIDEWALK, STRUCTURAL CONCRETE, REINFORCING STEEL

1. **Description.** This work shall consist of that described in Division 600 Concrete Paving; Section 704 Concrete Retaining Walls and Steps; Section 606 Concrete Curb and Gutter; Section 607 Concrete Sidewalks; mld Division 700 Bridges, Culverts, Related Construction of the 2007 State Specifications.

2. **Materials.** All materials used in the performance of the items of work shall comply with Division 600 and Division 1000 for Concrete Paving (47B).

3. **Construction Methods.**

(a) Concrete Paving shall be mixed, placed mld finished as provided in Sections 603.03.

(b) Concrete Retaining Walls and Steps shall be mixed, formed, placed and finished in accordance with Section 704.

(c) Concrete Curb mld Gutter shall be mixed, placed and finished in accordance with Sections 606.01 through 606.03.

(d) Concrete Sidewalks and Drives shall be mixed and finished in accordance with Sections 607.01 through 607.03 and Sections 609.01 through 609,03.

(e) Structural Concrete for box culverts, bridges anddams shall be mixed and furnished in accordance with Section 704.

(f) Reinforcing Steel. Steel bars for concrete reinforcement shall conform to Section 707 of the 2007 State Standard Specifications for Highway Construction and shall be deformed, of Grade 40 or Grade 60 billet or Grade 40 or Grade 60 axle steel as shown in the plans, specifications or Special Provisions.

4. **Method of Measurement and Payment.**

(a) Portland Cement Pavement shall be measured in place and paid for by the square yard at the contract bid price for "P.C.C. Pavement" at the thickness shown in the proposal and on the plans. Such payment shall be considered full compensation for furnishing all materials including, but not limited to, reinforcing steel, dowel bars, joint sealer, special joints, hauling, placing, sawing, finishing and curing said concrete paving and performing all incidental work necessary to complete the item of work.

(b) Integral Curb shall be subsidiary to the unit contract bid price for P.C.C. concrete pavement.

(c) Concrete Curb Wall shall be measured and paid for by the cubic yard in place at the contract bid price for "Concrete Curb Wall" through and including transitions from Concrete Curb Wall to Standard Integral Curb. Said payment will be considered full compensation for furnishing all materials and labor necessary to complete the item of work.

(d) Concrete Curb and Gutter shall be measured and paid for by the linear foot for "Concrete Curb and Gutter". Said payment shall be considered full compensation for furnishing all materials and labor necessary to complete the item of work.

(e) Portland Cement Concrete Sidewalks shall be measured and paid for by the square foot at the contract bid price for "5 Inch P.C.C. Sidewalks". Said payment shall be considered full compensation for furnishing all materials and labor necessary to complete the item of work.

(f) Portland Cement Concrete Drives shall be measured and paid for by the square yard at the contract bid price for "6 Inch P.C.C. Drives". Said payment will be considered full compensation for furnishing all materials and labor necessary to complete the item of work.

(g) Structural Concrete shall be measured and paid for per cubic yard at the contract bid price. Said payment will be considered full compensation for furnishing all materials and labor necessary to complete the item of work.

(h) Payment of steel reinforcement shall be made at the contract bid price per "pound". Such payment shall be considered full compensation for furnishing all materials and labor necessary to complete the item of work.

SECTION G-PAVEMENT, CURB AND GUTTER, SIDEWALK AND DRIVE REMOVAL

1. **Description.** This work shall consist of removing and disposing of Asphaltic Concrete Paving, Concrete Paving, Concrete Curb and Gutter and Concrete Sidewalks and Drives.

2. **Construction Methods.** Limits of paving removals for Asphaltic and Portland Cement Concrete Paving including Curb and Gutter, Sidewalks and Drives, when indicated in the plans or directed by the Engineer, shall be sawed to a depth sufficient to result in a straight and undamaged edge on the remaining pavement.

   Where pipelines are to be installed by open cut in streets on which asphalt or concrete pavement exists, the pavement shall be neatly cut out in a straight line along both edges

of the trench. Cutting will be done with a concrete saw or other suitable means acceptable to the Engineer. The paving so cut will be removed, loaded and hauled to a dump approved by the Engineer. Limits of paving removed will be designated by the Engineer.

3. **Method of Measurement and Payment.**

(a) Removal of all types of roadway paving shall be unclassified and shall be measured and paid for on a square yard basis at the contract bid price for "Pavement Removal". Such **payment shall be considered full compensation for furnishing all materials and labor** necessary to complete the item of work.

(b) Removal of pavement for drives will be measured and paid for on a square yard basis at the contract bid price for "Driveway Pavement Removal". Such payment shall be considered full compensation for furnishing all materials and labor necessary to complete the item of work.

(c) Removal of concrete curb and gutter shall be measured and paid for on a linear foot basis at the contract bid price for "Curb and Gutter Removal". Such payment shall be considered full compensation for furnishing all materials and labor necessary to complete the item of work.

(d) Removal of concrete sidewalk shall be measured and paid for on a square foot basis at the contract bid price for "Sidewalk Removal". Such payment shall be considered full compensation for furnishing all materials and labor necessary to complete the item of work.

(e) Saw cutting pavement will not be paid for directly but shall be considered subsidiary to the bid items of the contract, unless otherwise so specified in the bidding documents.

SECTION H-REMOVAL OF EXISTING STRUCTURES

1. **Description.** This work shall consist of that described in Section 203 of the 2007 State Specifications.

2. **Construction Methods** used shall be in conformance with Section 203.02.

3. **Method of Measurement and Payment.**

(a) Removing existing concrete box culverts, dams, retaining walls, storm sewer inlets and catch basins, etc. shall be measured and paid for on a per each basis for each item removed at the contract bid price as specified in the Proposal, which payment shall be considered full compensation for providing all labor and materials necessary to complete the work.

(b) Removal of existing storm sewer shall be measured and paid for on a linear foot basis for the type and size indicated in the proposal and on the plans.

SECTION I-REINFORCED CONCRETE PIPE

1. **Description.** This work shall consist of that described in Section 1037 of the 2007 State Specifications.

2. **Materials** used in the construction shall conform to minimum material requirements shown as follows:

   (a) Reinforced Concrete Pipe shall conform to the requirements of AASHTO M170, M206
   C 76 76 ASTM Designation or the latest revision thereof, for Class III Reinforced
   Concrete storm sewer and culvert pipe.

   The various classes of pipe designated shall meet the following

   requirements: (1) Class III Reinforced Concrete Pipe-D Load 0.01 in

   crack 1,350 lbs.
   Class III Reinforced Concrete Pipe-D Load Ultimate 2,000 lbs.

   (2) Concrete Proportions- as designated in Section 5.2.1 concrete (ASTM 76 76) with not less than six U.S. standard bags of cement per cubic yard.

   (3) Concrete Strength- 4,000 psi

   (4) Pipe Acceptance- as specified in Section 3.1.1 (ASTM 76 76) three edge bearing test. In addition, the reinforced concrete pipe manufactured under this specification will be required to meet absorption requirements of concrete as indicated in ASTM Specification C 76.

3. **Construction Methods.** All transporting, delivering, placing, excavating and backfilling of storm sewer shall conform to the requirements of Section 720 except that backfill material for the lowest 90 degrees shall be sand, placed <md compacted to the required density under the direction of the Engineer. Bedding will be required for all reinforced concrete pipe and corrugated metal pipe installed on this project.

4. **Method of Measurement and Payment.**

   (a) Excavation backfilling and compaction of trenches for storm sewers shall not be measured and paid for directly but shall be considered subsidiary to the bid items of the contract.

(b) Pipe for storm sewer shall be measured and paid for on the linear foot basis of the contract bid price for "C.M.P. Storm Sewer" and "R.C.P. Storm Sewer" for the pipe sizes indicated in the plans and specifications as provided in Section 720.05.

(c) Pipe for sanitary sewer shall be measured and paid for on the linear foot basis at the contract bid price for "V.C.P. Sanitary Sewer" for the pipe size indicated in the plans and specifications. Said payment shall be considered full compensation for excavation, disconnecting house services from the existing sewer main, installing the sanitary sewer, wyes and house sewer service lines, plugging service lines at the point of disconnection, backfilling and compacting the trench, performing all incidental work and providing all equipment, labor and materials necessary to complete the item of work.

SECTION J-CATCH BASINS, MANHOLES, INLETS AND JUNCTION BOXES

1. **Description.** This work shall consist of that described in Sections 916 Catch Basins, Manholes, Inlets and Junction Boxes and 917 Reconstruction of Manholes and Adjusting Manholes to Grade.

2. **Materials.** All materials furnished shall conform to Section 916.02 except steel and gray iron castings shall be the types specified on the plans.

3. **Construction Methods.** Construction will be in accordance with Sections 916.03.

4. **Method of Measurement and Payment.**

(a) Excavation backfill and compaction will not be measured and paid for directly but shall be considered subsidiary to the bid items of the contract.

(b) Manholes and Inlets shall be measured and paid for at the contract bid price per each for the types specified and said payment shall be considered full compensation for furnishing all labor, equipment and materials, including steps and covers, cast iron sanitary sewer, adapter and incidental work necessary to complete the item of work.

(c) Manholes requiring an adjustment of 24 inches or greater to bring said structure to grade shall be measured and paid for at the contract bid price per each for 24 Inch Risers, which payment shall be considered full compensation for furnishing all labor, equipment and materials (including fabrication, steps and covers) necessary to complete the item of work.

(d) The work of Adjusting Manholes and Reconstruction of Manholes from 0 to 24 inches shall be measured and paid for at the contract bid price per each for "Adjusting Sewer Manholes to Grade", which payment will constitute cost of all materials, equipment and labor necessary to complete the item of work.

SECTION K-SANITARY SEWER

SECTION K-3-0 - SCOPE OF WORK

3.001 The work covered by this section of the specifications consists of furnishing all labor, plant, equipment, appliances and materials, and performing all operations necessary to construct and complete sanitary sewers and appurtenances in strict accordance with these specifications, the applicable drawings, and subject to the terms and conditions of the contract.

Section K-3-1 - Materials

3.101 Vitrified Clay Pipe. All vitrified clay pipe shall meet the requirements and specifications for "Extra Strength Clay Sewer Pipe", A.S.T.M. Designation C700 and subsequent revisions, or as otherwise shown on the plans. All vitrified clay pipe shall have factory-fabricated joints that meet the requirements and specifications of the latest revision of "Compression Joints for Vitrified Bell and Spigot Pipe", A.S.T.M. C425, or as otherwise shown in the plans. Provide VCP in 4" through 36" nominal diameter.

3.102 Polyvinyl Chloride Gravity Sewer Pipe and Fittings. All polyvinyl chloride gravity sewer pipe **and fittings** shall comply with the requirements and specifications of the latest revision of the following standards:

1. ASTM D-3034 SDR-35 for nominal pipe size 8" (200 mm) through 15" (380 mm). When noted on the drawings, provide SDR26 sewer pipe conforming to ASTM D-3034 for 8" (200 mm) through 15" (380 mm).

2. ASTM F-679 for nominal pipe size 18" (460 mm) through 36" (910 mm).

3. ASTM F-794 pipe stiffness – 46 PSI 4" (100 mm) through 36" (910 mm).

4. ASTM F – 1803 pipe stiffness – 46 PSI 18" (450mm) through 36" (910 mm).

The PVC pipe **and fittings** shall be joined with integral bell and spigot type rubber gasketed joint. All P.V.C. joints shall comply with the requirements and specifications of the latest revision of ASTM F-477, "elastomeric gaskets for joining plastic pipe". All pipe shall be made of P.V.C. plastic having a cell classification of 12454-C, or 12364-C as defined by ASTM D-1784. The fittings shall be made of P.V.C. plastic having a cell classification of 12454-C, or 12364-C as defined by ASTM D-1784.

Provide manhole and fitting adapters as required for ASTM F-794 and **ASTM F-1803** pipe provided. This shall include connection to A-Lok manholes, service saddles, and the sewer pipe configuration.

All PVC sanitary sewer pipe shall be green in color. All PVC sewer pipe used for reclaim water shall be purple in color.

3.103 <u>Ductile Iron Pipe and Fittings.</u> All ductile iron pipe shall meet the requirements and specifications of the latest revision of ANSI/AWWA C151/A21.51, or as otherwise shown in the plans.

The pressure class or thickness class of ductile iron pipe to be used shall be as noted on the drawings but not less than pressure class 350 for 8" through 12", pressure class 250 for 14" through 20", pressure class 200 for 24", and pressure class 150 for 30" through 48".

All ductile-iron pipe and fittings requiring cement-mortar lining shall comply with the latest revision of ANSI/AWWA C104/A21.4. All ductile iron pipe and fittings used in sewer applications shall have the internal surface lined with Griffin Sewer Coat Lining, or approved equal. The lining shall be calcium aluminate mortar made of fused calcium aluminate cement and fused calcium aluminate aggregates. Thickness of the lining shall be minimum of: 0.125" (3.175 mm) for 6" (150 mm) through 12" (300 mm) and 0.1875" (4.763 mm) for 14" (360 mm) through 24" (600 mm).

A two component polyurethane coating system may also be used for the internal lining of ductile iron pipe and fittings in lieu of calcium aluminate mortar. The lining material shall consist of a polyisocyanate resin and polyol resin which shall be mixed in a 1:1 ratio at the time of application. It shall be an ASTM-D16 type V system. All surfaces to be lined shall be cleaned to a near white metal finish (SSPC-SP10) as applied to ductile iron pipe and fittings. All surfaces to be coated shall be completely dry, free of moisture, dust, grease, or any other deleterious substances, at the time of coating or lining is applied. The dry film thickness (DFT) of internal lining shall be 40 mils (0.040 inch) (1.0 mm) nominal. Thickness determinations using a type 1 magnetic thickness gage shall be conducted in accordance with Steel Structure Painting Council SSPC-PA2 Specification as applied to ductile iron pipe and fittings. The coating thickness on the sealing areas in the bell socket interior shall be 8 mils (0.008 inch) (0.02 mm) nominal with a maximum of 10 mils (0.25 mm). Repair and touchup shall be performed in accordance with the manufacturer's recommended repair and touchup procedures. All field cut ends shall be repaired and sealed prior to installation.

Holiday testing shall be conducted using test equipment described in AWWA standard C210-84 Section 5.3.3.1 and in accordance with the coating manufacturer's recommendation. The Contractor shall supply the test equipment for testing lining thickness and Holiday testing.

All ductile-iron and gray-iron fittings shall comply with the latest revision of ANSI/AWWA C110/A21.10.

All ductile-iron compact fittings shall comply with the latest revision of ANSI/AWWA C153/A21.53. All pipe sizes 4" (100 mm) through 24" (600 mm) shall utilize compact ductile iron fittings. All fittings 4" (100 mm) through 24" (600 mm) shall conform to pressure class 350.

All pipe sizes 30" (760 mm) through 48" (1200 mm) shall utilize ductile iron fittings. All Fittings 30" (760 mm) through 48" (120 mm) shall conform to pressure class 250.

All flanged ductile-iron pipe with threaded flanges shall comply with the latest revision of ANSI/AWWA C115/A21.15.

Whenever the plans or specifications call for the installation of polyethylene easement, provide low density polyethylene film in accordance of the latest revision of ANSI/AWWA C105.

All ductile iron pipe joints shall meet the requirements and specifications of the latest revision of ANSI/AWWA C111/A21.11.

All fittings shall be mechanical joint "Class D". All pipe shall be mechanical joint or bell-tite (slip joint) unless shown otherwise in the plans, or prior approval for an alternate is secured in writing from the Engineer.

3.104 <u>High Density Polyethylene Sewer Mains</u>. All Polyethylene (PE) (HDPE – High **Density Polyethylene Pipe) sewer mains shall have a Ductile Iron pipe size (DIPS). Unless** otherwise stated in the specifications or plans the HDPE sanitary sewer main shall have a minimum DR-9 for boring applications. Provide minimum pressure class rating of 200 psi for DR-9 HDPE pipe as per ANSI/AWWA C906 Table 9. The cell classification shall be PE 3408 HDPE according to ASTM D3350. The construction and fabrication of the HDPE water main shall comply with the appropriate standards as set forth in the latest edition of ANSI/AWWA C906.

1) Provide Affidavit of Compliance of all HDPE as per ANSI/AWWA C906 Section 6.3.

2) All HDPE pipe shall be color coded with a green strip to indicate it is used for sanitary water.

3) All fusion welds shall be in accordance with manufactures recommendations. All fusion welds shall be completed by properly trained personnel approved by the manufacture.

4) When new HDPE pipe is to be fused with existing HDPE piping, the purchaser of the new HDPE pipe shall inform the manufacturer of the cell classification of the existing HDPE pipe as per ASTM D3350, and obtain from the manufacturer a list of the validated fusion parameters that may be used to join the purchased piping to the existing piping. The manufacturers shall be consulted to determine the appropriate fusion procedures.

5) Butt Fusion Fittings shall be made of HDPE material with a minimum material designation code of PE3408 and with minimum cell classification of PE345464C. Butt Fusion Fittings shall meet the requirements of ASTM D3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All fittings shall meet the requirements of ANSI/AWWA C906. Marking for molded fittings shall comply with the requirements of ASTM D3261. Fabricated fittings shall be marked in accordance with ASTM F2206.

3.105 DIP Restrained Joint Pipe and Restrained Joints. When restrained joint pipe (i.e. , Snap-Lok) is required, the contractor shall supply a joint system equal to Griffin "Snap-Lok" River Crossing Pipe, American "Flex-Ring Joint", or approved equal. When restrained joints are required, the contractor shall supply a restrained joint equal to a Griffin "Field Lok" gasket", US Pipe "Field-Lok" gaskets, American "Fast Grip" Gaskets, or approved equal.

3.106 Standard Manholes. Manholes shall be constructed as indicated on the plans. Tops shall be fitted with Class 35 gray cast iron rings and covers weighing not less than 450 pounds (200 Kg) conforming to ASTM A48-87. Manholes over three (3) feet (0.9 M) in depth shall be equipped with polypropylene encapsulated steel rod steps utilizing 1/2" (1.25 cm) diameter Grade 60 steel reinforcement. The steps shall be placed on approximately sixteen (16) inch (406 mm) centers. Drop inlet manholes shall be constructed where indicated on the plans.

Manholes of precast sections conforming to A.S.T.M. C478 specifications shall be used. Precast concrete sections for manholes shall be installed with bituminous joint filler.

Concrete used in the construction of manholes shall utilize an "Az" life factor design. The minimum cover over the inner reinforcing steel (z), measured from the steel surface to the inside of the pipe wall, shall be such that the product of the Alkalinity (A) of the cover concrete, expressed as calcium carbonate equivalent, multiplied by the minimum cover in inches (z) shall be no less than 0.50. In achieving the design Az factor, the alkalinity content of the components and the thickness of steel cover may both be varied, provided that the minimum provisions of ASTM C76 are met: and provided that the actual inside diameter of the section is not less than the nominal inside diameter (size) of section.

3.107 Preformed Manhole Base(s). The Contractor shall install preformed manhole base(s) when directed by the Engineer or as noted on the drawings. The Contractor shall provide a performed manhole base constructed integral with the bottom manhole section. The base shall be a minimum of 5" (125 mm) thick reinforced with #4 diameter bars on 12" (300 mm) centers each way. The preformed manhole base shall be set upon 12 inch (300 mm) thick, 3/4" (19 mm) (nominal) limestone subgrade base (compacted) and trimmed to the appropriate elevation. The manhole base shall be fitted with appropriate sized Alok's as manufactured by A-lok Products, Inc., or approved equal. The invert shall be properly grouted to conform to the flow path required.

3.108 Structural Brick. Bricks shall be of the type that are satisfactory to the Engineer, and shall be laid in 1:2 cement mortar.

3.109 Manhole Rings and Covers. Unless shown otherwise in the plans, the rings and covers for manholes shall be a 450 pound (200 Kg) Class 35 gray cast iron machined ring and cover. The ring and cover shall be Deeter No. 1030 or Neenah 12-1703.

3.110 Grout. Grout where required shall consist of equal parts of sand and cement with sufficient water to produce the proper consistency.

3.111 Manhole Steps. Manhole steps are not required unless otherwise noted on the plans. When manhole steps are required, they shall be a steel reinforced copolymer polypropylene step utilizing a 1/2" (1.25 cm) diameter grade 60 steel reinforcement and conform to applicable ASTM A48-87. Manhole steps shall meet the requirements of the OSHA standards. Steps shall be model PS1-PF as manufactured by M.A. Industries Inc., or approved equal. All manhole steps shall be place on approximately sixteen inch (16") (406 mm) centers.

3.112 Steel Encasement. Smooth wall encasement pipe shall be of welded steel construction and shall be new material with a minimum yield point of 35,000 psi (241,000 kPa). The wall thickness shall be 0.250" (1.25 cm) or as indicated on the drawings. The encasement pipe shall be cleaned and coated on the outside with two coats of coal tar paint, Koppers, "Bitumastic Super Service Black"; Valspar, "High-Build Bituminous Coating 35-5-10"; or Tnemec, "46-449 Heavy Duty Black".

3.113 Casing Chocks. The Contractor shall use casing chocks. Casing chocks shall be of the type that bolt into the carrier pipe. The chock shall be 8" (200 mm) in length. The chocks shall be as manufactured by Pipeline Seal and Insulator, Inc., Model C8G-2, Advance Products and System Model SI-8" (200 mm) long with 1" (2.54 cm) or 2" (5.08 cm) wide runners, or approved equal.

3.114 Casing End Seal. All steel encasement pipes shall be closed at each end with a standard pull-on S-shaped seal as manufactured by Pipeline Seal and Insulator Inc. (PSI), Model S, Advance Model AC end seals, or approved equal.

3.115 Sanitary Sewer Services.

1) 4" (100 mm) service pipe shall be utilized on all service connections unless otherwise specified.

2) Main Size x 4" (100 mm) service tees shall be utilized unless otherwise specified.

3) Sanitary sewer services shall be cast iron (mortar lined) vitrified clay or PVC. PVC sewer pipe shall be SDR26 ASTM D3034 or Sch 40 PVC for 4" (100 mm) and 6" (150 mm) sizes and shall be SDR35 ASTM D3034 or heavier for 8" (200 mm) pipe. All PVC fittings shall comply with applicable specifications as stated in Section 3.102. All joints shall be gasproof, watertight, and rootproof. All P.V.C. sewer service pipe and fittings shall be surrounded with a six inch (6") (150 mm) gravel bedding as specified in Section 3.206.

4) All sewer services shall be constructed and installed by the Contractor as indicated on the drawings. Any work to be done on the customer side of the property line, except for connecting to existing services, shall be done by a licensed plumber. All service line work to be completed between the main and the property line may be done without the services of a licensed plumber. This work shall be deemed to be done by a sewer main Contractor. All service line work to be done by a sewer main Contractor shall be limited to the work as indicated on the drawings and within these contract documents, or as directed by the Engineer.

The sewer main contractor shall secure a plumbing permit for each sewer service to be installed or worked on. All plumbing permits shall be obtained before the actual service line work is to begin.

3.116 Submittals. The Contractor shall provide to the Engineer the following submittals, shop drawings, certifications and other related documents for review and approval:

1) Provide catalog cuts showing weights, dimension and sizes of all pipe materials, fittings, glands, bolts, adaptors, etc. to be utilized on this project.
2) Provide catalog cuts showing weights, dimensions and sizes of all manholes, manhole steps, ring and cover to be utilized on this project.
3) Provide catalog cuts showing weights, dimensions and sizes of all casings, casing chocks, and casing end seals to be utilized on this project.
4) Provide sieve analysis of all bedding materials.
5) Provide catalog cuts of sealants used to seal profile pipe with approved manufacturer procedures.
6) See specification 1.606 for additional details.

SECTION K-3-2 - CONSTRUCTION METHODS

3.201 Excavation. The ditch shall be excavated along the lines designated by the Engineer and to the depth given by him. The Contractor shall furnish, at his own expense, all planks, stakes, spikes, grade boards, and twine that may be required. The Engineer shall have the right to limit the amount of trench that may be opened in advance of the line of work. Should the trench be excavated to a greater depth than that given by the Engineer, the Contractor shall refill to grade, at his own expense, with good, well-tamped material. The width of the trench shall be approximately one (1) foot (300 mm) greater in the clear than the external diameter of the pipe to be laid therein. Trenches, where required, shall be properly sheeted and braced. The bottom of the trench under each pipe shall be shaped to receive the bottom quadrant of the pipe barrel. Bell holes shall be excavated so that, after placement, only the barrel of the pipe receives bearing pressure from the trench bottom.

Whenever wet or unstable soil that is incapable of properly supporting the pipe as determined by the Engineer, is encountered in the trench bottom, such soil shall be removed to the depth and length determined by the Engineer, and the trench backfilled to grade with sand, gravel or other suitable material.

All grading in the vicinity of trench excavation shall be controlled to prevent surface water from flowing into the trench. Any water accumulating in the trench shall be removed by pumping or other approved method. Material excavated from the trenches shall be stacked in an orderly manner a sufficient distance back from edge of trenches to avoid overloading and prevent slides or cave-ins. Materials unsuitable for backfilling shall be wasted by the Contractor as directed by the Engineer.

A minimum of one (1) foot (300 mm) of topsoil (unless otherwise noted on the plans) shall be removed in any and all area covered by vegetation. This topsoil shall be stockpiled separately from the material removed from the remainder of the trench. After the pipe is installed and the trench backfilled to an elevation one (1) foot (300 mm) (unless otherwise noted on the plans) below grade, the topsoil shall be replaced and compacted as previously described.

Excavation will not be classified. Whatever material is encountered shall be excavated to the proper grades and, if in any locations such material is not sufficient to provide a uniform, even bed for the pipe, the trench shall be excavated at least three (3) inches (76 mm) deeper than the grade at the bottom of the pipe and the space thus excavated shall be refilled with earth or sand and thoroughly compacted. Before any excavation is begun, the Contractor shall contact Diggers Hotline at 1-800-331-5666.

3.202 Protection of Existing Utilities. The accuracy of location of existing underground utilities as shown on the plans is not guaranteed. It shall be the duty of the Contractor to locate these utilities in advance of excavation and to protect same from damage after uncovering. No house service lines are shown on the plans. The Contractor shall contact the owners of the utilities for assistance in locating these service lines. Any expense incurred by reason of damaged or broken lines shall be the responsibility of the Contractor.

The Contractor shall not begin any excavation until he has contacted Diggers Hotline at telephone number 1-800-331-5666.

3.203 Tunneling. Tunneling, when necessary, shall be done under the supervision of the Engineer. Jacking or boring may be permitted where indicated in the plans. Before proceeding with boring or jacking, the Contractor shall submit to the Engineer for his approval a plan sketch showing the frame, bracing, pit details, etc. Whenever a steel casing is required, joints shall be welded with full strength welds. The Contractor shall maintain proper joint alignment and use full penetration welds.

3.204 Pipe Laying and Jointing. The placement and embedment of the sewer pipe shall comply with the appropriate specifications as noted below:

1) All vitrified clay sewer pipe shall comply with the latest revision of ASTM-C12.
2) All ductile iron sewer pipe shall comply with the latest revision of ANSI/AWWA C600.
   a) Installation of polyethylene encasement shall comply with the latest revision of ANSI/AWWA C105.
3) All polyvinyl chloride sewer pipe shall comply with the latest revision of ASTM D-2321.

The installation of all sewer pipes shall also comply with the following:

Pipe shall be protected at all times against impact shocks and free fall. Laying of pipe in finished trenches shall be commenced at the lowest point, with the spigot ends on bell-and-spigot pipe and tongue ends on tongue-and- groove pipe pointing in the direction of the flow. Pipe shall be set firmly to line and grade, and preparatory to making pipe joints, all surfaces of the pipe to be jointed

shall be cleaned and dried. Joints shall be made tight to meet requirements of tests specified in Section 3.209, 3.210, 3.211, and 3.213.

Sewer trenches shall be kept free from water by a method approved by the Engineer. The Contractor shall not pump sewage into a street or pump to a storm sewer unless authorized by the Engineer. Sanitary sewage must be returned to the sanitary sewer by means of pipe and hoses unless it is impossible to do so. Then disposal must be approved by the Engineer

When spiral or longitudinal closed profile pipe is provided, the Contractor shall seal the ends of all cuts of the closed profile pipe with a manufactured approved sealant and adhere to manufacturer's written procedures for sealing the open space. The closed profile pipe shall be installed in all manholes in such a manner the cut ends of the pipe are permanently sealed. In addition, the Contractor shall permanently seal all closed profile openings at a location 2' - 3' outside of the manhole. Any time a cut pipe is utilized, the ends shall be sealed and a second seal placed 2' - 4' away from the cut end.

3.205 Manhole Installation. All manholes shall be constructed as indicated on the drawings. The contractor shall insure that all elevations, as noted on the plans, are strictly adhered to. Any deviation of elevations shall be brought to the immediate attention of the Engineer or his representative. All manholes shall be installed straight and plum. All pick openings and pipe entrances shall be fully grouted and finished in a workman like manner.

3.206 Pipe Bedding. All sewer main shall be installed using bedding detail III or IV as noted on special plan detail sheets. The space between the pipe and sides of the excavation shall be filled and compacted with granular bedding as specified. The bedding material shall extend as a minimum 12 inches (300 mm) above the top of all PVC and VCP sewer mains before the trench box is moved. A bench shall be constructed to allow the trench box to set above the top of the sewer main.

If other construction practice is desired, it shall be submitted in writing to the Engineer for review and approval. In the event a different construction practice is desired, the procedure shall be reviewed with respect to trench width, soil loads, and live loads such as H-20 traffic loading.

VCP sewer pipe shall adhere to bedding detail III as per ASTM C-12 with appropriate maximum depth of installation.

PVC sewer pipe shall adhere to bedding detail III and have a minimum modulus of soil reaction (E') of 100 PSI or greater, and have a maximum depth for deflections of 5% or less, and comply with applicable requirements set forth in Unibell Recommended Standard UNI-B-5 latest revision.

DIP shall adhere to bedding detail IV with appropriate pressure class and associated maximum depth of installation, and comply with latest revision of AWWA C150/A21.50 and applicable sections of AWWA C600-87.

The granular bedding shall have the following gradation:

Sieve Size	Minimum % Retained on Sieve	Range
1.0 inch	-0-	
No. 4	34%	± 5%
No. 10	63%	± 10%
No. 30	88%	± 5%
No. 200	98.5%	± 1.5%

Note: Granular bedding is similar to NDOR Type ABX sand and gravel aggregate

The granular bedding shall be placed around all VCP and compacted to a minimum of 90% optimum proctor density for depths of 4 feet to 30 feet. Trench width shall adhere to 118 MCP technical bulletin (118 Sheet 2 of 2).

The granular bedding for PVC pipe shall be compacted to a maximum of 80% optimum proctor density for depth 4 feet to 16 feet and 90% optimum proctor density for depths 17 feet to 30 feet.

The granular bedding for DIP shall be compacted to 80% of optimum proctor density for depths up to 30 feet.

Trench width shall be kept to a minimum and as noted within these specifications or as noted in the drawings.

If in the event the bedding material cannot be properly compacted, then the Contractor shall provide a coarse aggregate bedding complying with the following gradation.

Sieve Size	Minimum % Retained on Sieve	Range
1 1/2 inch	-0-	
3/4 inch	20%	± 5%
3/8 inch	47%	± 10%
No. 10	80%	± 10%
No. 200	95%	± 5%

Note: Coarse aggregate bedding is similar to a NDOR crushed rock base course material.

3.207 **Trench Backfilling**. Trench backfill shall conform to following:

1) All sewer pipe shall be bedded as noted above. Bedding process shall be accomplished by introducing backfill material in layers not to exceed 6 inches in depth and compacted.

2) Upon bedding of pipe, fill may be introduced suitable to the type of method that will be used for compaction, i.e., compactor, hydraulic vibrator, etc. Lift thickness will be determined in field by inspector and job foreman with a maximum loose lift thickness of 12 inches.

3) Compaction tests to be taken 7' to 8' below top of trench or beginning 2-3' to 4' above top of pipe, which ever is deeper, then taken in 2' to 3' increments, with final test taken 1' below surface at final grade. Tests to be taken at 50 to 100 lineal foot (15 M to 30 M) of trench, to be determined on job site. Tests to be taken around manholes on all four sides 4' to 5' out from manholes at same depths as tests taken in trench. Contractor will be required to make excavation for tests.

4) Test results for compaction shall meet or exceed following:

   a. 95% standard proctor density for terraces.

   b. 98% standard proctor density for driveways, sidewalks, and streets.

   c. Assumption that moisture content (±) 3% of optimum failure of test to reach these minimum results will require recompaction by Contractor.

5) No unsuitable material will be allowed in backfilling, i.e., rock, saturated soils, excessively dry soils, concrete, grasses, etc. Contractor will be required to remove such material from the job site and replace with adequate amounts of approved material. The Contractor shall supply suitable backfill material from an approved borrow site acceptable to the Engineer at the unit price in the proposal.

   Any backfill found unstable because of plastic soils will have to be replaced by the Contractor with suitable material. No additional compensation will be granted.

6) Water settling will not be permitted.

7) The select bedding material shall be granular fill as noted in specification 3.206.

8) If proper compaction requires additional soil to be brought to the site by the Contractor, all expenses for this additional soil shall be considered subsidiary to the pipe installation.

9) The Contractor shall hand tamp around all manholes with hand tampers or pad tampers **"Jumping Jacks"** to insure proper compaction.

10) In the event settlement of any backfill associated with the project is encountered, the Engineer shall notify the Contractor in writing to repair all defects, including settlement and associated street repair, if it is discovered within the three (3) year maintenance period. No extra monies will be paid for repairs caused by settlement of the backfill.

3.208 Trench Wall Support. All trenches shall be braced or sheeted as to local soil conditions dictate and in full observation of OSHA, as well as local, State of Nebraska, and other Federal requirements. There shall be sufficient tamped cover over pipe to protect in removal of shoring material.

A full depth trench box shall be used for all sewer main installations. At the Contractor's discretion, wood or steel shoring can be used. All wood or steel shoring shall be cut off at the top of the sewer main and the lower section left in place.

3.209 Exfiltration Test. Exfiltration test of the sewer lines shall be conducted upon completion of a section of wastewater line in accordance with ASTM F1417 and by the following method as directed by the Engineer:

After a manhole to manhole section of wastewater line has been backfilled and cleaned, pneumatic plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any ground water that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize.

After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed "Acceptable" if the time required in minutes for the pressure to decrease from 3.5 psig to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameters in the following tables:

.....SEE FOLLOWING TABLES.....

ASTM C828

Vitrified Clay Pipe Diameter in Inches	Minutes
8 (200 mm)	4.0
10 (250 mm)	5.0
12 (300 mm)	5.5
15 (380 mm)	7.5
18 (450 mm)	8.5
21 (530 mm)	10.0
24 (600 mm)	11.5
27 (690 mm)	13.5
30 (750 mm)	15.0
33 (840 mm)	16.5
36 (900 mm)	18.0
42 (1070 mm)	21.0

ASTM F1417 TABLE 1

PVC Pipe Diameter in Inches

Pipe Diameter Inches	Minimum Time, Minutes:Seconds	Length for Minimum Time, Ft.	Time for Longer Length:Seconds
8	7:34	298	1.520 L
10	9:26	239	2.374 L
12	11:20	199	3.418 L
15	14:10	159	5.342 L
18	17:00	133	7.692 L
21	19:50	114	10.470 L
24	22:40	99	13.674 L
27	25:30	88	17.306 L
30	28:20	80	21.366 L
33	31:10	72	25.852 L
36	34:00	66	30.768 L

The following alternative method of exfiltration may be used with prior approval of the Engineer:

Plug the lower end of a section of wastewater line and fill with water. Let the water stand for approximately four hours and then fill the line again. After the line has reached its maximum absorption, refill to the original depth; after one hour, record the new level of water in the manhole and convert to gallons; and then subtract the actual manhole loss previously determined for one hour to set actual line loss. Pipe leakage allowance shall be 100 gallons per inch diameter per mile per day (1 liter per mm diameter per Meter per day).

3.210 Testing. Upon completion of sewers, each pipe line and manhole will be lamped, checked for flow and freedom from accumulated earth or debris, and checked for the general requirements of the specifications. The Contractor shall furnish such tools, hose and other equipment necessary for making such tests, and shall be present during the inspection to note any deficiencies that may exist. Before final acceptance, all sewers shall be clean, shall comply with the specifications and all contract documents and shall be acceptable to the Engineer and municipal authorities. Hastings Utilities Director of Engineering or representative is to be present to witness all testing.

3.211 Television Inspection – Sanitary Sewer Lines. Television (TV) inspection recorded digitally on DVD media shall be required on completion of all sewer main lines. The TV inspection shall include on screen measurement along the pipe being inspected – starting with zero at the first manhole of any run of pipe being inspected. In addition to the DVD, a written report shall be provided noting defects, service connection(s), sags, and other anomalies. The written report shall also denote the time, date, starting manhole number and station, direction of camera travel, and ending manhole number and station.

The Contractor shall provide a DVD and written report of the inspection. Video (VHS) will not be permitted.

Contractor shall furnish the name of firm proposed to do the television (TV) inspection on the subcontractor designation sheet. One copy of the DVD shall be given to Hastings Utilities for their files. Cost of TV inspection and DVD will be subsidiary to bid. Contractor will not be paid retention until television inspection is received.

3.212 Separation from Water Mains.

Horizontal Separation. Whenever possible, sewers should be laid at least ten (10) feet (3 M), horizontally), from any existing or proposed water main. Following should be true if conditions prevent a lateral separation of ten (10) feet (3 M) to a water main if:

1) It is laid in a separate trench.
2) It is laid in the same trench with the water mains located at one side on a bench of undisturbed earth.
3) In either case the elevation of the crown of the sewer is at least eighteen (18) inches (450 mm) below the invert of the water main.

Vertical Separation. Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least eighteen (18) inches (450 mm) below the bottom of the water main. When the elevation of the sewer cannot be buried to meet the above requirement, the water main shall be relocated to provide this separation or reconstructed with slip-on or mechanical-joint cast iron pipe, for a distance of ten (10) feet (3 M) on each side of the sewer. One full length of water main should be centered over the sewer so that both joint will be as far from the sewer as possible.

Special Conditions. When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the water main should be constructed of slip-on or mechanical-joint cast iron pipe, and the sewer constructed of mechanical-joint cast-iron and both services should be pressure tested to assure water-tightness.

3.213 Deflection Testing. Deflection tests shall be performed on all flexible pipe (i.e., P.V.C.). The test shall be conducted after the final backfill has been in place at least 30 days to permit stabilization of the soil-pipe system. No pipe shall exceed a deflection of five percent (5%). If deflection exceeds five percent (5%), replacement or correction shall be accomplished as approved by the Engineer. A rigid ball or mandrel shall be used for the deflection test. It shall have a diameter not less than ninety-five percent (95%) of the nominal inside diameter of the pipe. The pipe shall be measured in compliance with ASTM D 2122, "Standard Test Method of Determining Dimension of Thermoplastic Pipe and Fittings". The test shall be performed without mechanical pulling devices.

3.214 Encasement Pipe. The encasement pipe for railroad and street crossings shall be installed by tunneling. The encasement pipe shall be installed as shown on the plans. Casing chocks shall be provided as indicated on the drawings. The casing chocks shall be securely fastened to the carrier pipe. The casing chocks shall be placed approximately 7'-0" (2.1 M) on center with a casing chock placed 3'-0" (0.9 M) from each end of each section of pipe. On a standard 20'-0" (6 M) length of pipe, three casing chocks shall be installed.

Both ends of the encasement pipe shall be closed with a standard pull-on S-shaped seal as manufactured by Pipeline Seal and Insulator Inc., Model S, Advanced Model AC End Seal, or approved equal.

After installation of the smooth steel pipe, Hastings Utilities shall install two 48 pound (22 Kg) sacrificial anodes or as determined by the Engineer shall be attached and buried at each end of the encasement. The anodes shall be attached to the outside of the encasement, one on each side.

3.215 Abandonment of Existing Sewer Facilities and Other Underground Utilities. The Contractor where noted on the drawings shall abandon in place or remove existing sewer facilities or other underground utilities as required. In particular, the following methods shall be used:

1) Abandon in Place Sewer Main.

   The Contractor shall fill the entire void created by the abandoned sewer with flowable fill. The flowable fill shall be a high fly ash mixture with minimum of 0.5 to maximum of 1.5 sacks/cyd of Portland Cement. The aggregate maybe sand or very fine gravel. Submit a design mix for approval by the Engineer. Each end of the sewer main to be abandoned and at each manhole, whether left in place or abandoned in place, shall be grouted closed with a minimum of 2 foot deep concrete plug. The plug shall be fully set before adding flowable fill.

   After injecting flowable fill the open access end of the sewer shall then be closed with a minimum of 2 foot deep concrete plug as noted above. The design mix of the concrete grout shall be submitted for approval. Provide a minimum 28 days strength of 10KSI and shall be a non-shrink grout.

2) Abandon In Place Sewer Manhole.

The manhole shall be filled with fill sand and enough water added to insure flowability of the sand. The top ring and cover of the manhole shall be removed as well as the top cone section. In addition, manhole shall be removed as directed or at least 2 feet (600 mm) below paving subgrade. The top 1 foot of the abandoned manhole shall be filled with concrete. The concrete shall be a 6-1/2 sack ABX mix with a 28 day strength of 3000 PSI (21,000 kPa).

3. Removal of sewer mains or manholes and other underground utilities.

The Contractor shall remove all the debris, bricks, concrete, bases, ring and covers, pipes, etc. Breaking of VCP and abandon in place will not be allowed unless otherwise directed.

3.216 Pipe Plug. The Contractor shall utilize a water tight mechanical plug or cap of appropriate size to secure the open end of the pipe from debris entering into the pipe. This shall be strictly enforced at the end of each day, during any breaks lasting more than 30 minutes or unscheduled stoppage which the pipe may be left unattended for more than 30 minutes. Buckets, duct tape and other methods will not be allowed.

3.217 By-Pass Pumping. The Contractor shall furnish, install, and operate pumps, plugs, conduits, and other equipment to divert the flow of sewage around the pipeline reach in which work is to be performed. The pumping system shall be of sufficient capacity to handle existing flow plus additional flow that may occur during an unexpected rainstorm. Work shall not commence if inclement weather is forecast during the expected installation period. If pumping is required on a 24-hour basis, engines shall be equipped in a manner to keep noise to a minimum. Normal working hours for bypass pump shall be between 8:00 a.m. and 7:00 p.m. If pumping is required beyond these times prior approval from the engineer will be required. Submit request in writing 24 hours before pumping is to begin.

Standby pumps shall be provided as required. By-Pass pumping for all sewers will be required to have 100% redundancy in the pumps and the pump driver unless prior approval is given by the engineer (engine, electric motor, and/or generator). Pumping shall be done by the Contractor in such a manner that it will not damage public or private property or create a nuisance or health menace. The pumped sewage shall be in an enclosed hose or pipe and shall be reinserted into the sanitary sewer system. Sewage shall not be allowed to free flow in gutters, streets, or over sidewalks, etc. No sewage will be allowed to flow into the storm inlets for conduits. After the work has been completed, flow shall be restored to normal. The cost of By Pass pumping will be subsidiary to bid.

The Contractor shall submit and have a bypass pumping procedure approved by the Engineer two days prior to the start of the bypass.

SECTION K-3-3 - METHOD OF MEASUREMENT AND BASIS OF PAYMENT

3.301 Sewer Pipe in Place. Sewer pipe shall be measured and paid for at the contract unit price for lineal foot for various sizes, including excavation and backfill complete in place. Sewer pipe shall be measured for payment after installation of the sewer, through all line manholes, through the walls of structures and existing manholes, and shall include the portion of all wyes considered as main line sewer. Such payment shall be full compensation for all labor, plant, equipment and materials necessary for a complete and accepted project, including removal of all debris, and final cleanup of the job.

3.302 Fittings and Tees. Fittings and tees shall be paid for at the contract unit price for various size fittings and tees. Measurement for payment shall include that portion of the tee from the barrel of the main line sewer to the end of the fitting or tee. A 1" X 4" (0.25 cm x 1 cm) lumber sufficient in length to reach the ground surface shall be placed vertically at the end of each tee or service termination.

3.303 Manholes. Manholes shall be paid for at the contract unit price bid per manhole, for a depth of five (5) feet (1.5 M), which payment shall include base, stubouts and ring with cover. Additional payment shall be made for manholes more than give (5) feet (1.5 M) in depth, measured from flow line to top of cover, at the contract unit price for each vertical foot or fraction thereof in excess of five (5) feet (1.5 M).

3.304 Boring and Encasement. The construction of encasement pipe shall include boring, excavation, backfill, casing pipe, and cathodic protection. All other items necessary to complete the installation encasement pipe shall be considered subsidiary to the bid item. The amount of encasement installed shall be measured along the centerline of the encasement and shall be paid for at the contract unit price.

3.305 Abandonment of Sewer Mains and Manhole.

A) The abandonment of sewer mains in place requiring flowable fill shall be paid on a per linear foot basis. No additional compensation will be made for different volumes of flowable fill for pipe sizes 4" (100 mm) through 15" (380 mm). For sewer mains greater than 15 inches (380 mm), a per size per linear foot (meter) payment will be made. The payment shall include all grouting, labor, excavating, backfilling, and all other incidental activities to complete the work specified.

B) The abandonment of sewer manholes in place shall be made on a per manhole basis. No additional compensation will be made for various depths. The payment shall include all grout, labor, excavating, backfilling, and all other incidental activities to complete the work specified.

C) For sewer mains left in place without flowable fill shall not be paid for directly but shall be considered subsidiary to the installation of the sewer main. This includes all related grouting, labor, excavating, backfilling, and other incidental activities.

D) Removal of manholes shall be made on a per manhole basis. No additional compensation will be made for various depths. The payment shall include all grout, labor, disposal, excavating, backfilling, and all other incidental activities to complete the work specified.

E) Removal of sewer mains and other underground utilities shall be paid on a per linear foot basis. No additional compensation will be made for different sizes of pipe for 4" (100 mm) through 15" (380 mm). For sewer mains and other underground utilities greater than 15" (380 mm), a per size per linear foot (meter) payment will be made. The payment shall include all grouting, labor, disposal, excavating, backfilling to complete the work specified.

3.306 **Sales Tax Exemption.** City will furnish sales tax exemption to successful bidder.

SECTION L-WATER MAINS

SECTION L-4-0 - SCOPE OF WORK

The work covered by this section of the specifications consists of furnishing all labor, plant, equipment, appliances and materials, and performing all operations necessary to construct and complete water mains and appurtenances in strict accordance with these specifications, the applicable drawings, and subject to the terms and conditions of the contract.

Section L-4-1 - Materials

4.101 **Water Mains.** All water mains shall be constructed of ductile iron meeting the requirements as specified in these contract documents unless otherwise noted on the drawings.

4.101(a) **Ductile Iron Water Main (DIP).** The ductile iron pipe shall conform to the latest revision of "Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Line Molds, for Water and Other Liquids, ANSI/AWWA C151/A21.51 and shall be thickness Class 52 unless otherwise stated on the plans.

Ductile Iron Pipe Shall Be:

1) Cement-mortar linings: ANSI A21.4 (AWWA C104).

2) Outside coating: AWWA C151/A21.51 Minimum of 1 mil thickness (0.025 mm) of bituminous coating (paragraph 51.8.1).

3) a. Push on joint, ANSI A21.11 (AWWA C111).

   b. Alternate pipe joint: Mechanical joint ANSI A211.11 (AWWA C111).

c. As required: Restrained joint pipe for special use will be called out on plans and proposal sheet. Shall have joints as called for and pipe shall be to ANSI A21.51 (AWWA C151) ANSI A21.4 (AWWA C104). The restrained joint pipe shall be Snap-lok D.I.P. as manufactured by Griffin Pipe Products or approved equal.

4) In accordance with AWWA C151/A21.51-96 Section 5.1.1.2 provide Affidavit of Compliance.

5) Whenever the plans or specifications call for the installation of polyethylene encasement, provide low density polyethylene film in accordance with the latest revision of ANSI/AWWA C105.

4.101(b) **Ductile Iron Pressure Class Pipe.** Whenever the plans provide for the installation of ductile iron pressure class pipe in lieu of Class 52 pipe, the DIP pipe shall comply with the latest revision of ANSI/AWWA C151/A21.51-96 and as noted above in technical specification 4.101(a) with the exception that the all thickness shall comply with 350 PSI (2400 kPa) pressure class pipe for sizes 3 thru 24 inch (76 mm thru 600 mm). Whenever the plans or specifications call for the installation of polyethylene encasement, provide low density polyethylene film in accordance with the latest revision of ANSI/AWWA C105.

4.101(c) **Polyvinyl Chloride Water Main (PVC).** Polyvinyl chloride water main shall conform to the latest revision of polyvinyl chloride (PVC) pressure pipe 4 inch thru 12 inch **cast iron O.D.** (100 mm thru 300 mm) for water distribution ANSI/AWWA C900-97 and Appendix A of ANSI/AWWA C900-89 or molecularly oriented PVC (PVCO) pipe conforming to the standards of ANSI/AWWA C909, latest revision for 6 inch through 12 inch pipe **cast iron O.D.** (100 mm thru 300 mm). All PVC and PVCO pipe shall be pressure thickness Class 200 unless otherwise stated on the plans. **PVC water mains 16 inch through 48 inch cast iron O.D. (400 mm through 1220 mm) shall conform to the latest revision of AWWA C905. All AWWA C905 water mains shall have a minimum DR as noted on the proposal or the drawings.**

Polyvinyl Chloride Pipe Shall Be:

1) Provide certification for all PVC and PVCO pipe provided for potable water service. Comply with specification C-900 AWWA Section 4.2.3. and comply with NSF61 specification for each class, type, and size of PVC or PVCO to be provided.

2) Provide all PVC and PVCO pipe provided shall comply with AWWA C-900 Section 4.3.3.2 as referenced in Table 3 for DR-14; **or** 200 PSI pressure class of AWWA **C-909** Section 4.3.4.1 as referenced in Table 1 for 200 psi pressure class **or AWWA C905 Section 4 Table 2 with appropriate DR shall be as noted on the proposal or drawings.**

3) Provide required certification documentation as noted above in accordance with AWWA C-900 Section 5.2, **or AWWA C-909 Section 5, or AWWA C-905 Section 5.2.**

4) All PVC and PVCO pipe provided for potable water service shall be blue in color. All PVC and PVCO pressure pipe used for reclaim water shall be purple in color.

5) In accordance with AWWA C-900 Section 6.3 or AWWA C-909 Section 6.3, **or AWWA C-905 Section 6.3,** provide Affidavit of Compliance.

4.101(d) High Density Polyethylene Water Mains. All Polyethylene (PE) (HDPE – High Density Polyethylene Pipe) water mains shall have a Ductile Iron pipe size (DIPS). Unless otherwise stated in the specifications or plans the HDPE water main shall have a minimum DR-11 for open trench applications and DR-9 for boring applications. Provide minimum pressure class rating of 160 psi for DR-11 and 200 psi for DR-9 HDPE pipe as per ANSI/AWWA C906 Table 9. The cell classification shall be PE 3408 HDPE according to ASTM D3350. The construction and fabrication of the HDPE water main shall comply with the appropriate standards as set forth in the latest edition of ANSI/AWWA C906.

6) Provide Affidavit of Compliance of all HDPE as per ANSI/AWWA C906 Section 6.3.

7) All HDPE pipe shall be color coded with a blue strip to indicate it is used for potable water.

8) Provide FM Fitting MJ adapter kit for all connections to Cast Iron or Ductile Fittings and valves.

9) All fusion welds shall be in accordance with manufactures recommendations. All fusion welds shall be completed by properly trained personnel approved by the manufacture.

10) Flanged and Mechanical Joint adapters to confirm to ASTM D3261. Markings for molded or machined flanged adapters of MJ adapters shall be per ASTM D3261. Fabricated (including machined) flange adapters shall be per ASTM F2206.

11) When new HDPE pipe is to be fused with existing HDPE piping, the purchaser of the new HDPE pipe shall inform the manufacturer of the cell classification of the existing HDPE pipe as per ASTM D3350, and obtain from the manufacturer a list of the validated fusion parameters that may be used to join the purchased piping to the existing piping. The manufacturers shall be consulted to determine the appropriate fusion procedures.

12) Polyethylene fusion fittings may be molded, thermoformed from pipe sections, or fabricated by heat fusion joining polyethylene components prepared from pipe, molded fittings, thermoformed pipe, or polyethylene sheet or block.

13) Butt Fusion Fittings shall be made of HDPE material with a minimum material designation code of PE3408 and with minimum cell classification of PE345464C. Butt Fusion Fittings shall meet the requirements of ASTM D3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All fittings shall meet the requirements of ANSI/AWWA C906. Marking for molded fittings shall comply with the requirements of ASTM D3261. Fabricated fittings shall be marked in accordance with ASTM F2206.

14) Electrofusion Fittings shall be made of HDPE material with a minimum material designation code of PE3408 and with a minimum cell classification of PE345464C. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Markings shall be according to ASTM F1055.

4.102 Compact Ductile Fittings. All fittings for pipe sizes 4" thru 24" (100 mm thru 600 mm) shall be Ductile Iron Pressure Class 350 psi (2400 kPa) and shall conform to ANSI A21.53.94 (AWWA C153) current revised edition of said standards as minimum specifications. All fittings for pipe sizes 30" thru 48" (260 mm thru 1200 mm) shall be Ductile Iron Pressure Class 250 and shall conform to ANSI A21.10.93 (AWWA C110) current revised editions of said standards as minimum specifications.

Ductile Iron Fittings Shall Be:

1) Cement-mortar lined, ANSI A21.4.90 (AWWA C104).
2) Mechanical joint, ANSI A21.11.90 (AWWA C111).
3) Testing, ANSI A21.10.93 (AWWA C110) or ANSI A21.53.94 (AWWA C153).
4) Fitting to be cast marked DI or Ductile with pressure rating and size and type fitting.

4.103 Restrained Joint Couplings. When noted on the drawings, the Contractor shall erect and install restrained joint coupling(s). The restrained joint coupling shall be a Griffin Bolt-Lok restrained joint, or American MJ coupled restrained joint.

The restrained joint coupling shall provide a positive longitudinal connection between fittings or fittings and restrained joint pipe as applicable. The Contractor shall install applicable thrust blocks as noted on the drawings in addition to the restrained joint coupling.

4.103(a) DIP Restrained Joint Pipe. When restrained joint pipe (i.e., Snap-Lok) is required, the Contractor shall supply a joint system equal to Griffin "Snap-Lok" River Crossing Pipe, American "Flex-Ring Joint", or approved equal. When the proposal or drawings require retaining glands, the Contractor shall provide Megalug Series 1200 Mechanical Joint Restraint or equal. The Contractor may provide in lieu of retaining glands "Field-lok" gaskets" by Griffen Pipe , "Fast-grip" gaskets by American Pipe, or equal.

4.104 Resilent Seated Gate Valves, Cut in Sleeves. All gate valves 4" and larger up to and including **thirty inch (30") (260 mm)** shall be ductile iron body resilient seated gate valves conforming to AWWA C509, C515, AWWA C111 and ANSI A21.11 specifications and current revisions. All gate valves shall be suitable for mechanical joint connection to ductile iron pipe complete with bolts, glands, and required gaskets. All gate valves shall have a 2" square (50 mm) operating nut and nonrising stem and O-ring type seals. All resilient seated gate valves shall be Mueller Model A-2360-20, M and H Style 3067, Flow Control Series 2500, Clow Model 2638 or 2639 valve or approved equal. **When beveled gearing is required, provide valves with a bevel gear assembly to allow the gate to move in a horizontal direction**. Cut in sleeves for use with gate valves where required shall be mechanical joint and have stop screw incorporated in body, and shall be Mueller No. H840, H841, or approved equal. For installation

requiring a 4", 6", or 8" (100 mm, 150 mm, or 200 mm) cut-in valve, the Contractor shall utilize Mueller C-2360-44 cut-in valves or approved equal. The Contractor shall utilize duck tipped gaskets or plain tipped gaskets as required to complete the field installation. **All exposed bonnet and packing bolts shall be ASTM F593 Type 304 Stainless Steel.**

4.105 **Buried Service Butterfly Valves.** All valves of nominal sixteen inch (40 mm) through forty eight inch (1200 mm) shall be rubber seated cast iron body Butterfly valves conforming to AWWA C504, AWWA C111, and ANSI A21.11 specifications. All Butterfly valves shall have a valve body constructed of cast iron ASTM A126 Class BM. All Butterfly valves shall be suitable for mechanical joint connection to ductile iron pipe complete with bolts, glands, and all required gaskets. All Butterfly valves shall have a two inch (50 mm) square operating nut and shall be fully gasketed with "O" rings or split "V" type packing. All Butterfly valves shall be grease packed as required for buried service. The valve operator shall conform to the latest revision of AWWA C504 for Class 150B and shall be capable of developing the torques listed in table No. 4 of the AWWA C504 specification with a maximum input of 150 ft./lbs. (0.667 KN) on the operating nut. The operator shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping of fluttering. All Butterfly valves shall be designed for installation with the shaft horizontal, and the operating nut vertical. All Butterfly valves shall open by turning the operating nut in a counter- clockwise direction (as viewed from the top). All Butterfly valves shall be Mueller Lineseal III Class 150B Butterfly valves, Dezurk AWWA Butterfly valves for buried applications, Pratt NDT Buried Service Butterfly Valves, or manufacturer's approved equal. All Butterfly valves shall be installed with operating nut located on either the south or east side of water mains. All exposed Bonnet and packing bolts shall be stainless steel 304 or equal.

4.106 **Valve Boxes.** All buried valves shall be provided with Buffalo type cast iron valve boxes or alternate as specified.. Valve boxes shall have a screw type extension sleeve and be designed for the size of valve on which it is to be used and for the depth of cover as required. Covers shall have the word "WATER" cast thereon. Valve boxes shall be Mueller No. H10360, Tyler Series 6850 Type 664-S, 666, 668 as required, or approved equal.

4.106(a) **High Density Polyethylene (HDPE) Valve Boxes.** Whenever the drawings or proposal request installation high density polyethylene (HDPE) valve boxes, the Contractor shall provide and install American Flow Control Trench Adapter Valve Box or equal. The valve body shall be constructed of high density polyethylene material complete with a steel stem extension tube. The unit shall be fitted with an extension stem tested to 1000 pounds of torque. The lid shall be made of gray cast iron with the word "WATER" imprinted end to top of the lid. Provide HDPE boxes of appropriate depth and size as per manufacturer's recommendations.

Adjustment in valve box height shall be considered subsidiary to the valve installation.

4.107 **Solid Ductile Iron Sleeves.** Contractor shall furnish couplings for connecting ductile iron to ductile iron pipe or ductile iron to cast iron pipe, or ductile iron to PVC pipe. The inside diameter of the coupling shall be suitable for connecting the ends of either PVC, ductile, or cast iron pipe as required. All solid ductile iron sleeves shall comply with the requirements of 4.102. Provide only long solid sleeves unless otherwise directed by the Engineer. Solid ductile iron sleeves will not be called out on the drawings; however, Contractor shall provide solid sleeves as field conditions warrant and as approved by the Engineer.

4.107(a) Mechanical Joint Connections. When called for on the drawings or proposal, the Contractor shall provide Foster adaptors or equal for water main size 4" through 24". Provide a ductile iron fitting meeting material and pressure requirement of the current revision of AWWA C110 and as defined by Section 4.102 of these specifications.

Provide tee bolt kits for all applications.

4.108 Fire Hydrants. Fire hydrants shall comply with Dry-Barrell Fire Hydrants ANSI/AWWA standard C-502 and latest revisions. Main valve opening shall be 5-1/4", and inlet shall be mechanical joint for 6" (150 mm) cast iron or ductile iron pipe. Hose connections shall be two - two and one half inch (2-1/2") (65mm), and one - four and one half inch (4-1/2") (115 mm) pumper connection. All threads shall be national standard conforming to NFPA standard for fire hose connections. Unit shall have standard 1-1/2" (40 mm) pentagonal operating nut and shall open counterclockwise. Unit shall be traffic type hydrants with ground break away flange system. Seals shall be O-ring. Fire hydrants shall be painted silver enamel paint as designated by Federal Standard 595A. The prime coat shall conform to Federal Spec. TT-C-4946, or equal. The final coat shall conform to Federal Spec. TT-V-51.

In accordance with ANSI/AWWA C-502 Section 5.1.3 the hydrostatic test shall be conducted at 300 PSI (2100 kPa) for a minimum of 60 seconds with no leakage.

In accordance with ANSI/AWWA C-502 Section 5.3 the supplier shall deliver all hydrants to Hastings Utilities for pressure testing at its North Denver Station facilities at an agreed time and during normal business hours. The supplier shall provide 72 hour notice before testing is required.

In Accordance with ANSI/AWWA C-502 Section 1.7 provide Affidavit of Compliance.

All fire hydrants shall be furnished with all connecting bolts, nuts, glands, gaskets, etc., required for immediate installation. Units shall be Mueller No. A-423, or Flow Control No. B84B Quik Fix, or approved equal. All fire hydrants will be 6'-0" (1.8m) bury unless noted differently on plans. All exposed bolts and nuts that are typically buried shall be stainless steel 304 or equal.

4.109 Water Services and Service Line Connections.

1) Copper tubing used for water service lines shall be Type "K" soft temper, conforming to ANSI H-231. All fittings for use with copper tubing shall be of solid brass construction.

2) Plastic water service lines of not more than 2 inches (50 mm) in diameter may be used for residences in lieu of copper service lines, subject to the following:

   a. Plastic tubing used for water service lines shall meet AWWA C901 Polyethylene pipe, SDR-9 PE3408 ASTM D2737, Pressure Class 200 PSI (1400 kPa) or AWWA C904-06 PEX pipe, SDR-9 ASTM F876 (PEX 1006) Pressure Class 200 PSI (1400 kPa). It shall be O.D. based on sizes 3/4 inch (20 mm) thru 2" (50 mm) conforming to the outside diameter of copper tubing.

   b. Fittings for plastic water service lines used for plastic water piping shall be of brass pack joints and shall conform to AWWA Standard ASTM B62-Index 115-85-5-5. No plastic fittings or brass flared will be allowed.

c. Installation of plastic water service lines shall have a number 12 gauge **30 mil (10.76 mm) PVC coated, color blue, THHN, insulated copper wire supplied by HU, installed by Contractor**, attached to the corporation cock and run to the curbstop. The wire shall be taped to the service prior to backfilling.

d. Grounding. Grounding of electric services when plastic water services are installed: In the event a metal underground water pipe in direct contact with the earth for 10 feet (3 m) or more is not available on the premises, supplemental electrodes shall be provided. One shall be a rod or pipe electrode as specified in NEC 250-83, and the others shall be as mandated in NEC 250-81. The interior metal water system shall be bonded to the service equipment enclosure.

e. For replacement services the interior metal piping system shall remain bonded to the service equipment. If there is not a ground rod already in use, an 8-foot rod (2.4 m) shall be driven and connected to the service equipment. The grounding electrode system shall comply with NEC 250-81 and 250-84.

f. The city electrical inspector shall approve the installation after being satisfied that there is appropriate grounding.

g. The owner shall pay an additional fee in accordance with the prevailing council fee resolution, for having the plumbing and electrical inspectors make the foregoing inspections.

3) Polyvinyl Chloride Water Service Lines. For installation of 4", 6", and 8" (100 mm, 150 mm, and 200 mm) diameter service lines, the Contractor may use polyvinyl chloride pipe (PVC) or molecularly oriented PVC (PCVO) as specified herewithin. The PVC pipe shall comply with specification 4.101 (c).

a. All PVC water service pipe shall have a minimum pressure class of 200. All pipe connections shall be bell and socket or by mechanical joint when connecting PVC to cast iron/ductile iron pipe and fittings.

b. All fittings and transitions shall conform to specification 4.102 of this document.

c. All taps to PVC pipe of auxiliary service lines of two inches in diameter or smaller shall utilize tapping saddles.

d. Installation of PVC water service lines shall have a location wire consisting of a number 12 gauge 30 mil (10.76 mm) PVC coated, color blue, THHN, insulated copper wire **supplied by HU, installed by Contractor,** attached to the corporation valve as determined by the engineer and run to the curbstop. The wire shall be tapped to the service line prior to backfilling. The location wire shall be electrically intrinsic with reference to the water distribution system.

e. Grounding of electric services shall be in accordance to specification 4.108 Water Services; paragraphs 2(d) and 2(e) of this document.

f. The installation of PVC water service shall conform to specification 4.108 Water Services; paragraphs 2(f) and 2(g) of this document.

g. All water services lines of 8" or greater shall conform to specification 4.101, 4.102, 4.205, and other related and applicable specifications as noted within these documents.

4) Corporation Stops. Corporation stops shall be furnished and installed by Hastings Utilities through the permit system (Section 2, 2.011). This will include taps up to and including 2-inch diameter. Any Service larger than 2 inch will require ductile iron water main fittings.

All taps require a service saddle to be installed or otherwise noted within these specifications. The Contractor shall provide the service saddle and shall properly fasten the saddle to the main. Hastings Utilities shall provide the corporation stop as noted above. Provide an 18-8 ASTM F593 Type 304 stainless steel full body saddle equal to a Ford FS303 x Pipe O.D. x OS-CC4. Provide all saddles to accept tappered corporation valves of 1" to 2" as noted on the drawings. Provide saddles with flush body tappered Buna-N ASTM D200 rubber gaskets.

All HDPE water main taps require an Electrofusion fitting, Transition Saddle (Corp Saddle). The Contractor shall provide the transition saddle and shall properly fasten the saddle to the main. Hastings Utilities shall provide the corporation stop as noted above. Electrofusion Transition Saddle shall have a manufacturing standard of ASTM F1055. The Contractor shall provide Electrofusion Transition Saddle equal to Georg Fischer Central Plastics Company with brass 360 alloy outlet materials, and stainless 304 compression ring, and CC Threads or approved equal.

5) Curb Stop and Box. This item shall consist of one (1) curb stop and one (1) curb box. Curb stops shall be Mueller No. H-15155 or Ford B44 Series, unless otherwise specified, and shall be of the same nominal size as the service line to which they are connected. Curb stops shall be of heavy cast bronze construction and shall be Minneapolis pattern type. Curb boxes shall be extension type, cast iron, adjustable for length, and have Minneapolis pattern base. Lids shall have the word "WATER" cast in them and shall have a provision for being securely held in place.

6) All water services shall be constructed and installed by the Contractor at a minimum depth of 5'-0" or as by City code and as indicated on the drawings. Any work to be done on the customer side of the curb stop, except for connecting the service line to the curb stop, shall be done by a licensed plumber. All service line work to be completed between the main and curb stop may be done without the services of a licensed plumber. This work shall be deemed to be done by a water main contractor. All service line work to be done by a water main contractor shall be limited to the work as indicated on the drawings and within these contract documents or as directed by the Engineer.

The water main contractor shall secure and obtain a plumbing permit for each water service to be installed or worked on. All plumbing permits shall be obtained before the actual service line work is to begin.

4.110 **Thrust Block.** All thrust blocks shall be installed in accordance with the drawings. The class of concrete to be used for thrust blocks around fittings shall be Nebraska Department of Roads Class "47B" or Type "ABX". All thrust blocks shall be cast in place and shall be considered subsidiary to the unit price of water main in the contract. All concrete shall have minimum 28-day strength of 3000 PSI.

THRUST BLOCK DIMENSION				
Pipe Size Inch	A Feet	B Feet	C Feet	D Inch
4 (100 mm)	1 (0.3 M)	1 (0.3 M)	1 (0.3 M)	3 (75 mm)
6 (150 mm)	1.5 (0.45 M)	1.5 (0.45 M)	1 (0.3 M)	6 (150 mm)
8 (200 mm)	2 (0.6 M)	2 (0.6 M)	1 (0.3 M)	6 (150 mm)
10 (250 mm)	2.5 (0.75 M)	2.5 (0.75 M)	2 (0.6 M)	9 (225 mm)
12 (300 mm)	3 (0.9 M)	3 (0.9 M)	2 (0.6 M)	9 (225 mm)
14 (350 mm)	3 (0.9 M)	3 (0.9 M)	2.5 (0.75 M)	12 (300 mm)
16 (400 mm)	4. (1.2 M)	3 (0.9 M)	2.5 (0.75 M)	12 (300 mm)
18 (450 mm)	4 (1.2 M)	4 (1.2 M)	2.5 (0.75 M)	12 (300 mm)
20 (500 mm)	4 (1.2 M)	4 (1.2 M)	3 (0.9 M)	16 (400 mm)
24 (600 mm)	4.5 (1.4 M)	4.5 (1.4 M)	3 (0.9 M)	16 (400 mm)
30 (750 mm)	4.5 (1.4 M)	5. (1.5 M)	3.5 (1.0 M)	18 (450 mm)
36 (900 mm)	5 (1.5 M)	5 (1.5 M)	3.5 (1.0 M)	18 (450 mm)
42 (1050 mm)	5.5 (1.7 M)	5.5 (1.7 M)	4 (1.2 M)	24 (600 mm)
48 (1200 mm)	6 (1.8 M)	6 (1.8 M)	4 (1.2 M)	24 (600 mm)

4.111 **Machine Tap.** Hastings Utilities will furnish and install all machine taps. Contractor shall provide all excavation and backfill. Minimum excavation at each tapping point will be 4 ft. wide (1.2 M) and 6 ft. (1.8 M) long and shall be sufficiently below the main at point of tap in the installation of bolted sleeve. Hastings Utilities Water Department Personnel shall make determination in field as to tap location and give specific requirements. In the event that the uncovered water main is at a joint, .etc., excavation will be relocated as directed by Water Department Personnel.

4.112 **Steel Encasement.** Smooth wall casing pipe shall be of welded steel construction and shall be new material with a minimum yield point of 35,000 psi (241,000 Kpa). The pipe shall have a minimum wall thickness of "0.250" (6 mm) or as indicated on the drawings. The casing pipe shall be clean and coated on the outside with two coats of coal tar paint, Koppers, "Bitumastic Super Service Black"; Valspar, "High-Build Bituminous Coating 35-5-10"; or Tnemec, "46-449 Heavy Duty Black".

4.113 **Casing Chocks.** The Contractor shall use casing chocks. Casing chocks shall be of the type that bolt onto the carrier pipe. The chock shall be 8" (200 mm) in length. The chocks shall be as manufactured by Pipeline Seal and Insulation Inc., Model C8G-2, Advance Products and System Model SI-8" (200 mm) long with 1" (25 mm) or 2" (150 mm) wide runners, or approved equal.

4.114 **Casing End Seal.** All steel encasement pipes shall be closed at each end with a standard pull on S-shaped seal as manufactured by Pipeline Seal and Insulator, Inc. (PSI), Model S, Advance Model AC End Seals, or approved equal.

4.115 **Manholes.** Manholes shall be constructed as indicated on the plans. Manhole ring and cover shall be constructed of Class 35 gray cast iron weighing not less than 450 pounds conforming to ASTM A48-87 and satisfactory to the Engineer. The manhole ring and cover shall be Deeter No. 1030 or Neenah R-1703. Manholes over three (3) feet (0.9 M) in depth shall be equipped with copolymer polypropylene encapsulated steel rod steps utilizing 1/2" (13 mm) diameter Grade 60 steel reinforcement. The steps shall be placed on approximately sixteen (16) inch (400 mm) centers. Manhole steps shall be PSI-PF as manufactured by M.A. Industries, Inc.

Manholes of precast sections conforming to ASTM C478 specifications shall be used. Precast concrete sections for manholes shall be installed with bituminous joint filler.

4.116 **Submittals.** The Contractor shall provide to the Engineer the following submittals, shop drawings, certifications and other related documents for review and approval:

a. Provide catalog cuts showing weights, dimensions, and sizes of all pipe materials, fittings, glands, bolts, adapters, etc. to be utilized on this project.

b. Provide catalog cuts of all fire hydrants, gate valves, butterfly valves, fittings, manholes, valve boxes, grounding mechanisms, tracer wire, corporation valves, curb stop, curb stop boxes to be utilized on this project.

c. Provide catalog cuts showing weight, dimensions and sizes of all casings, casing chocks, and casing ends seals to be utilized on this project.

d. See specification 1.606 for additional details.

4.117 **Tracer Wire Locating Station:** Furnished by Hastings Utilities. Installed by Contractor subsidiary to bid.

SECTION L-4-2 - CONSTRUCTION METHODS

4.201 Excavation. The Contractor shall perform all excavation of whatever substances are encountered to the depth shown on the drawings, or to provide a minimum cover of five (5) feet (1.5 M) over the top of the pipe. The Engineer shall have the right to limit the amount of trench that may be opened in advance of the line of work. All excavated materials not required for backfill shall be removed from the project by the Contractor. Banks of trenches shall be kept as nearly vertical as practicable and, where required, shall be properly sheeted and braced. Trenches shall be of sufficient width to provide working space for proper laying and embedment.

The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its entire length, except for portions of the pipe sections where it is necessary to excavate for bell holes.

Whenever wet or unstable soil that is incapable of properly supporting the pipe, as determined by the Engineer, is encountered in the trench bottom, such soil shall be removed to the depth and length determined by the Engineer, and the trench backfilled to grade with sand, gravel or other suitable material.

All grading in the vicinity of trench excavation shall be controlled to prevent surface water from flowing into the trench. Any water accumulating in the trench shall be removed by pumping or other approved method. Material excavated from the trenches shall be stacked in an orderly manner a sufficient distance back from edge of trenches to avoid overloading and preventing slides or cave-ins. Material unsuitable for backfilling shall be wasted by the Contractor as directed by the Engineer. Any unauthorized excavation below grade shall be backfilled at the Contractor's expense with good, well-tamped material.

A minimum of one foot (1') (300 mm) of topsoil (unless otherwise noted on the plans) shall be removed in any and all areas covered by vegetation. This topsoil shall be stockpiled separately from the material removed from the remainder of the trench. After the pipe is installed and the trench backfilled to an elevation one foot (1') (300 mm), (unless otherwise noted on the plans) below grade, the topsoil shall be replaced and compacted as previously described.

Excavation will not be classified. Whatever material is encountered shall be excavated to the proper grades and if, in any locations, such material is not sufficient to provide a uniform, even bed for the pipe, the trench shall be excavated at least six inches (6") (150 mm) deeper than the grade at the bottom of the pipe and the space thus excavated shall be refilled with earth or sand and thoroughly compacted.

4.202 Protection of Existing Utilities. The accuracy of location of existing underground utilities as shown on the plans is not guaranteed. It shall be the duty of the Contractor to locate these utilities in advance of excavation, and to protect same from damage after uncovering. House service lines are shown on the plans. The Contractor shall contact the owners of the utilities for assistance in locating these service lines. Any expense incurred by reason of damaged or broken lines shall be the responsibility of the Contractor.

The Contractor shall not begin any excavation until he has contacted Diggers Hotline at 811.

4.203 Tunneling. Tunneling, when necessary, shall be done under the supervision of the Engineer. Jacking or boring may be permitted where indicated in the plans. Before proceeding with boring or jacking, the Contractor shall submit to the Engineer for his approval a plan sketch showing the frame, bracing, pit details, etc. Whenever a steel casing is required, joints shall be welded with full strength welds. The Contractor shall maintain proper joint alignment and use full penetration welds.

4.204 Pipe Cutting. Cutting of the pipe shall be kept to a minimum and shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise authorized by the Engineer, cutting shall be done by means of an approved type of mechanical cutter. Hydraulic cutters shall be used when practicable.

4.205 Installation of Water Mains.

4.205(a) Installation of DIP Water Mains. The installation of ductile iron water main shall be in accordance with the latest revision of AWWA C600. All DIP (Class 52 and Pressure Class) water main installation shall also be in accordance with the following:

1) Pipe and accessories shall be handled in such manner as to insure delivery to the work in a sound, undamaged condition.

2) While suspended in a sling and before lowering into the trench, all pipe shall be inspected for defects. Defective, damaged or unsound pipe will be rejected. Deflections from a straight line or grade, as required by vertical or horizontal curves, shall not exceed manufacturer's recommendations and approval by the Engineer.

3) Mechanical joints shall be installed under the provisions of the recommendations of the joint manufacturer.

4) Fittings at bends or deadends shall be firmly blocked against the vertical face of the trench to prevent fittings from being blown off the lines when under pressure. Blocking shall conform to the plan for concrete blocking for fittings. Where pipe ends are left for future connections, they shall be valved, plugged or capped as shown on the plans. Where connections are made between new work and existing mains, the connections shall be made by using fittings as required.

5) All DIP where noted on the drawings shall have a tracer wire buried beside the invert of the pipe as shown on the drawings. A tracer wire locating station will be supplied to the Contractor by HU. The tracer wire furnished by HU will be a THHN, Number 12 Gauge, 30 Mil (0.8 mm) PVC coated copper wire. The color will be blue. The wire shall be continuous and unspliced from tracer wire locating station to tracer wire locating station. The tracer wire shall be electrically intrinsic with reference to the water distribution system.

   All DIP water main or water service lines of 4" (100 mm) diameter or greater shall have warning tape buried 12" (300 mm) to 24" (600 mm) above the top of the pipe. The warning tape will be inscribed with the message "CAUTION BURIED WATER LINE". The warning tape will be a minimum of 3" (75 mm) in width. The warning tape will be a minimum 4 mils (0.1 mm) in thickness. The warning tape will be blue in color and furnished to Contractor by HU. Installation of tracer wire and warning tape will be subsidiary to bid.

4.205(b) **Installation of PVC Water Main.** The installation of polyvinyl chloride (PVC) water main shall be in accordance with the latest revision of AWWA C605.

All PVC water main installation shall also be in accordance with the following:

1) Pipe and accessories shall be handled in such a manner as to insure delivery to the work in a sound undamaged condition. All PVC pipe stored on site and expected to be stored for more than 3 months, shall be covered with tarpaulins to protect the pipe from ultra violet light damage as required by AWWA C-605 Section 2.3.1.

2) Prior to the pipe being placed in the trench and while suspended in a sling, all pipe shall be inspected for defects. Defective, damaged, scratched, bleached, cut, scarred, or unsound will be rejected. Deflections from a straight line or grade, as required by vertical or horizontal curves, shall not exceed manufacturer's recommendations and approval by the Engineer.

3) Mechanical joints shall be installed under provisions of the recommendations of the joint manufacturer.

4) Fittings at bends or deadends shall be firmly blocked against the vertical face of the trench to prevent fittings from being blown off the lines when under pressure. Blocking shall conform to the plan for concrete blocking for fittings. Where pipe ends are left for future connections, they shall be valved, plugged or capped as shown on the plans. Where connections are made between new work and existing mains, the connections shall be made by using fittings as required.

5) All PVC where noted on the drawings shall have a tracer wire buried beside the invert of the pipe as shown on the drawings. A tracer wire locating station will be supplied to the Contractor by HU. The tracer wire furnished by HU will be a THHN, Number 12 Gauge, 30 Mil (0.8 mm) PVC coated copper wire. The color will be blue. The wire shall be continuous and unspliced from tracer wire locating station to tracer wire locating station. The tracer wire shall be electrically intrinsic with reference to the water distribution system.

   All PVC water main or water service lines of 4" (100 mm) diameter or greater shall have warning tape buried 12" (300 mm) to 24" (600 mm) above the top of the pipe. The warning tape will be inscribed with the message "CAUTION BURIED WATER LINE". The warning tape will be a minimum of 3" (75 mm) in width. The warning tape will be a minimum 4 mils (0.1 mm) in thickness. The warning tape will be blue in color and furnished to Contractor by HU. Installation of tracer wire and warning tape will be subsidiary to bid.

4.205(c) <u>Installation of HDPE Water Mains</u>. The installation of HDPE water mains shall be in accordance to the following:

1) The pipe and accessories shall be handled in a manner to insure the work is sound undamaged condition.

2) All HDPE pipe shall be stored shall be covered with tarpaulins to protect the pipe.

3) All HDPE where noted on the drawings shall have a tracer wire buried beside the invert of the pipe as shown on the drawings. A tracer wire locating station will be supplied to the contractor by HU. The tracer wire furnished by HU will be a THHN, Number 12 Gauge, 30 mil (0.8 mm) PVC coated copper wire. The color will be blue. The wire shall be continuous and unspliced from tracer wire locating station to tracer wire locating station. The tracer wire shall be electrically intrinsic with reference to the water distribution system. Installation of the tracer wire will be subsidiary to the bid.

4) All HDPE water main or 4" (100 mm) or greater shall have a warning tape buried 12" (300 mm) to 24" (600 mm) above the top of pipe. The warning tape will be inscribed with the message "CAUTION BURIED WATER LINE". The warning tape will be a minimum of 3" (75 mm) in width. The warning tape will be a minimum of 4 mils (0.1 mm) in thickness. The warning tape will be blue in color and furnished to Contractor by HU. Installation of the warning tape will be subsidiary to the bid.

5) Prior to the pipe being placed in the trench and while suspended in a sling, all pipe shall be inspected for defects. Defective, damaged, scratched, bleached, cut, scarred, or unsound will be rejected. Deflections from a straight line or grade, as required by vertical or horizontal curves, shall not exceed manufacturer's recommendations and approval by the Engineer.

6) Joining methods:

   a) <u>Butt Fusion</u>: HDPE pipe joined by the butt fusion shall be done in accordance with ASTM F2620 or PPI TR-33. All fusion joints shall be made in compliance with the pipe or fitting manufacturer's recommendations. Fusion joints shall be made by qualified fusion technicians per PPI TN-42. Qualification of the fusion technician shall be demonstrated by evidence of fusion training within the past year on the equipment to be utilized on the project. Provide copy of Butt Fusion procedure to Engineer 10 days prior to construction for review and approval.

   b) <u>Saddle fusion</u>: HDPE pipe joined by Saddle fusion shall be in accordance with ASTM F2620, TR-41 or the fitting manufacturer's recommendations and PPI TR-41. Saddle fusion shall be used to fused branch saddles, taping tees, and other HDPE constructs onto the wall of the main pipe. Saddle fusion joints shall be made by qualified fusion technician. Qualification of the fusion technician shall be demonstrated by evidence of fusion training within the past year on the equipment to be utilized on the project. Provide copy of Saddle Fusion procedure to Engineer 10 days prior to construction for review and approval.

c) Electrofusion: HDPE pipe joined by Electrofusion shall be done in accordance with the manufacturers recommended procedure. Other sources of electrofusion joining information are ASTM F1290 and PPI TN-34. The process of electrofusion requires an electric source, a transformer, commonly called and electrofusion box. The electrofusion box must be capable of reading and storing the input parameters and the fusion results for later download to an electronic record file. Qualification of the fusion technician shall be demonstrated by evidence of electrofusion training within the past year on the equipment to be utilized for this project. Provide copy of Electrofusion procedure to Engineer 10 days prior to construction for review and approval.

d) Mechanical coupling that wrap around the pipe and act as saddles shall be recommended by the manufacturer as being designed for use with HDPE pipe. Mechanical connection of HDPE to auxiliary equipment such as valves, pumps, and fittings shall use mechanical joint adapters and other devices in conformance with the PPI Handbook of Polyethylene Pipe, Chapter 9 and AWWA Manual of Practice M55, Chapter 6.

e) Joint construction records are the critical parameters of each fusion joint. As required by the manufacturer this data shall be recorded either manually or by an electronic data logging device. All fusion joint data shall be included in the Fusion Technician's joint report and provided to the Engineer for review.

7) Buried HDPE pipe and fittings shall be installed in accordance with ASTM D2321 or ASTM D22774 for pressure systems, AWWA Manual practice M55 Chapter 7 and as specified within these specifications for the placement of Water Main.

4.206 Manhole Installation. All manholes shall be constructed as indicated on the drawings. The contractor shall insure all elevations as noted on the plans are strictly adhered to. Any deviations of elevations shall be brought to the immediate attention of the engineer or his representative. All manholes shall be installed straight and plum. Complete all grouting as required by the Engineer.

4.207 Service Interruptions. When it becomes necessary, for the purpose of making connections or for any other reason, to shut off or turn on water in any existing mains, it is the sole responsibility of the Contractor to notify the City Water Department, through the Resident Engineer, as to when and for how long service will be interrupted, and also to notify all water users well in advance to that they might prepare themselves for the period during which service might be interrupted. Valves shall not be opened or closed by anyone other than City Water Department personnel.

4.208 Fire Hydrants and Valve Boxes. All fire hydrants, valves, and valves boxes shall be installed in the lines as shown on the drawing and as directed by the Engineer. All apparatuses shall be set plum. Valve boxes shall be centered directly over the valves. Earth fill shall be carefully hand tamped around all valve boxes and fire hydrants. Valves boxes shall have the interiors cleaned of all foreign matter before installation.

All valve boxes shall be installed to permit without restriction valve wrenches. All fire hydrants shall be installed in accordance with the latest revision of AWWA Manual M17, "Installation, Field Testing and Maintenance of Fire Hydrants", and no more than 1/4" per two (2) vertical feet out of

plumb in any direction. The engineer shall measure the plumbness of all fire hydrants installed. Any fire hydrant not installed correctly and plumbed shall be straightened and any additional extensions of the barrel to raise it to grade shall be provided without additional reimbursement. Review of the plumbness test by the Engineer shall be requested by the Contractor prior to beginning of the project. If a review is not requested, the Engineer may assume the Contractor fully understands the requirements for proper hydrant installation.

4.209 Cleaning, Disinfection, Flushing and Pressure Testing of Water Mains

Procedures for the disinfection of the water mains shall be in accordance with the latest revision of AWWA C651. Specifically, each segment of completed water main to be disinfected shall not exceed a length greater than 1,000 LF unless otherwise approved by the Engineer.

All costs associated with disinfection, flushing and pressure testing of the water mains and appurtenances shall be considered subsidiary to the main installation.

To aid in the cleaning and disinfection of the water main the contractor shall comply with the following:

1. All water main materials shall be shipped in plastic wrap or provided removal plugs to limit contamination during shipping. Water main pipe shall be shipped with a tarp or cover to protect the pipe end (windward end) during transport.
2. Onsite storage of water main materials shall be placed on skids or blocks to limit contamination while in storage. Provide minimum of 4 inches elevation above the ground line and not located in areas that may become flooded.
3. Tarps or plastic wrap shall be provided to secure the open end of the pipe and water materials from contamination during site storage. Contractor shall limit site storage to amounts that can be installed in a timely manner to limit contamination.
4. Each section of pipe, all fittings and other water main assemblies shall be thoroughly inspected for presence of dirt, oil film(s), and debris prior to installation. Contractor shall remove and clean all visible contamination.
5. During installation the open end of the water main or assembly shall be fitted with a plug to limit contamination. This shall be used at all times. For periods where construction will be delayed for more than 1 hour a tight fitting plug shall be installed that will prevent water intrusion at a pressure of at least 10 feet of hydraulic head.
6. The use of pipe gasket lube shall be limited to Blue Lube manufactured by Whitlam Plumb-Pro or equal. The use of yellow gasket grease is not permitted or allowed to be stored on site. Pipe gasket lube shall be NSF Standard 14 and 61 certified for potable use. Care shall be taken to limit the amount of pipe gasket lube applied as this will aid in cleanup of the water main and assemblies.
7. Use of granular chlorine or chlorine tabs will not be permitted. Use of swabbing with chlorine prior to installation is recommended but not required.
8. As noted on the drawings a pig launching assembly shall be installed. Foam and / or polyethylene bristle pigs shall be provided by the contractor to aid in cleaning. Contractor shall provide at no cost all cleaning pigs and installation of the cleaning pigs.

9. A written plan for providing cleaning, disinfection and sampling shall be provided to the engineer for approval before main installation begins. A walk thru of the project prior to main installation shall be conducted with the contractor foreman to review disinfection procedures.

Flush Water Disposal

The contractor shall provide all piping, hoses, ditches and other conveyance devices to properly dispose of the water from the water mains. The following procedures shall be used:

1. Flush water containing chlorine in excess of 1 mg/l shall be directed to the sanitary sewer at rates that do not exceed the capacity of the receiving sanitary sewer. In the event a sanitary sewer is not available the contractor shall provide, install, and operate appropriate de-chlorination equipment. Plan and procedures for de-chlorination shall be approved by the engineer prior to commencing work.
2. Waters containing 1 mg/l or less of free residual chlorine to be flushed from the main shall be directed to appropriate storm sewers, ditches or other drainage ways. Disposal of flushed water shall be the responsibility of the contractor. Erosion caused by flushing activities shall be repaired by the contractor. Repair of right of ways and private property shall be completed to the satisfaction of the property owner or controlling authority.

Water Main Disinfection and Flushing

Water main disinfection and flushing shall be completed in a timely manner. As noted above a written plan shall be prepared and provided to the engineer for approval. The plan shall limit the amount of time water is allowed to be placed in the main prior to disinfection procedures are applied. The following terms and conditions shall be used with respect to disinfection and flushing of water mains:

Step 1. Pre-flushing (By HU Forces): Once the water main has been installed and all appropriate control valves placed into service, the water main shall then be flushed with potable water. This shall be done at a minimum velocity of 5 fps or maximum achievable with normal system water pressure. Pre-flushing of the water main shall be conducted for a sufficient period of time until the water is clear and then an additional five (5) pipe volumes of water shall be discharged. See above for flush water disposal requirements. Hastings Utilities forces shall be responsible for the operation of all Hastings water valves.

Step 2. Hydrostatic Pressure Testing (By Contractor): Immediately after pre-flushing of the main (within 1 hour) the water mains shall be hydrostatically tested. Hydrostatic testing shall be in accordance with the latest revision of AWWA C600 Section 4 or AWWA C605 Section 7 as deemed appropriate. Hydrostatic testing shall be performed at a pressure of 140 psi (965 kPa) minimum to 150 psi (1035 kPa) maximum, with an maximum drop in pressure of 2 psi (14 kPa) over a two hour period. All defective materials or improperly installed materials shall be repaired or replaced as deemed appropriate by the engineer. The hydrostatic pressure test shall be repeated after all repairs are completed and until satisfactory results are obtained.

Step 3. Aggressive Main Cleaning (Pigging) (By Contractor): Immediately after hydrostatic testing is satisfactorily completed (within 1 hour) the water mains shall be aggressively pigged using foam or polyethylene bristle pigs as deemed appropriate by the pig manufacturer and contractor experience. Pig selection shall be based upon the type and size of main installed. Every effort shall be made to

aggressively clean all sections of the water main. Pigs of appropriate size shall be launched into the water main and pushed through the main using water system pressure. Multiple pigs shall be launched until water flushed with the pig is clear. An additional 2 pigs shall then be launch to insure all debris has been removed. See above for flush water disposal requirements. Hastings Utilities forces shall be responsible for the operation of all Hastings water valves.

Step 4. Initial Disinfection (By Contractor): Immediately after the water main has been aggressively cleaned (within 1 hour), the water main shall be disinfected with chlorine. Sufficient amounts of chlorine shall be used to provide a minimum of 25 mg/l to a maximum of 100 mg/l of free chlorine residual for a minimum contact time of 24 hours and no more than 36 hours. Chlorine shall be added to each section of main using a continuous-feed method. The contractor shall provide, install, and operate all chlorination equipment. Chlorine material and placement is the responsibility of the contactor. No additional compensation is provided. Hastings Utilities forces shall be responsible for the operation of all Hastings water valves.

Step 5. Flushing (By HU Forces): Once the water main has been disinfected the water main shall be flushed. Flushing of the water main shall be conducted for a sufficient period of time to remove all traces of chlorine. A field chlorine test shall be conducted to confirm all chlorine has been removed. See above for flush water disposal requirements and specifically for waters containing chlorine. Once the chlorine is removed flush an additional five (5) pipe volumes. Hastings Utilities forces shall be responsible for the operation of all Hastings water valves.

Step 6. Bacteriological Sampling (By HU Forces): Once the water main has been flushed of disinfectant samples for coliforms and heterotrophic bacteria (a.k.a. HPC or plate count) shall be collected. The water shall be tested for chlorine residual to insure that all chlorine has been removed. The water samples shall be collected from a service tap. The contractor at his expense shall excavate a location in which Hastings Utilities Forces will install a 1 inch service saddle and polyethylene water service to allow for sampling. The water main shall not be aggressively flushed during the sample collection. The water main is deemed to be clean once two sets of samples are collected 24 hours apart and show no evidence of coliforms (zero coliforms) or heterotrophic bacteria (a.k.a. HPC or plate count) greater than 500 colony forming units per ml (500 cfu/ml).

All samples will be collected by HU forces and delivered to the testing lab. The Nebraska Health Department in Grand Island, NE or Servi-Tech Labs in Hastings, NE shall be used for the testing of these samples. Coli-Alert procedures shall be used for the testing of coliforms.

During each sampling event coliform and heterotrophic bacteria samples shall be collected at a point where system water enters the project. These samples are collected to insure the water used for cleaning of the mains is potable.

Step 7. Re-cleaning of the water main (By Contractor): If the water main after testing and flushing as noted above has not been successfully cleaned, then it shall be re-cleaned beginning with Step 3 as noted above. Selection of the pig type and construction shall be reviewed with the engineer for approval. All water used after initial Step 6 as noted above shall be metered using estimated flow rates as determined by Hastings Utilities. This water shall be purchased by the contractor at current residential (Urban) water rates. Expense of all retesting of the water main for coliforms and heterotrophic bacteria (a.k.a. HPC or plate count) shall be the responsibility of the contractor.

Step 8. Surfactant Cleaning (by Contractor): If deemed necessary by the contractor the water main may be cleaned using a National Sanitation Foundation (NSF) approved surfactant equal to a Johnson Screens

NW-400. Application rate of the surfactant shall be as per manufactures recommendation. NW-400 shall be injected at a rate of 1 gallon per 1500 to 2000 gallons of water. Additionally, the main shall be provided chlorine at a minimum rate of 25 mg/l and a maximum of 100 mg/l of free available chlorine. The surfactant and chlorine shall be allowed to be in contact with the pipe interior for a minimum of 24 hours and a maximum of 96 hours. Flushing of the surfactant and chlorine shall be deemed complete when there is not chlorine residual present.

4.210 **Separation from Sanitary Sewer Mains.** There shall be a minimum of eighteen (18) inches (450 mm) clearance between water mains and sanitary sewer mains crossing at approximately ninety degrees (90°).

4.211 **Trench Backfilling.** Trench backfill shall conform to following:

1) All water mains and services shall be properly bedded with insitu soils unless otherwise directed due to poor soils or soil conditions. The Engineer shall instruct the Contractor in proper operation and fill material if conditions are deemed less than favorable. Insitu soils typically deemed satisfactory are local clay, silt loam, and sandy soils found in the Hastings area.

   Ductile Iron Pipe. All ductile iron pipe shall be bedded as shown on bedding detail II of the plans with insitu soils to top of pipe or twelve inches (12") (300 mm) above top of pipe as noted. The bedding process shall be accomplished by mechanical means and by introducing backfill material layers not to exceed six inches (6") (150 mm) depth. Each lift shall be thoroughly compacted before introducing additional backfill material. Hand tamping will be required whenever streets, driveways, or terraces requiring sodding will be placed above the water main installed. The bedding shall be accomplished using a hand tamper for each six inch (6") (150 mm) lift of soil to the top of the pipe. Other mechanical means such as a rolling vibratory sheeps foot can be utilized for the next twelve inches (12") (300 mm) above the top of pipe. **All hand tamping shall be strictly enforced.**

   Polyvinyl Chloride Pipe. All polyvinyl chloride pipe irregardless of location shall be bedded as shown on bedding detail I of the plans with six inches (6") (150 mm) lifts of soil to a point twelve inches (12") (300 mm) above the top of pipe. **All hand tamping shall be strictly enforced.**

   Upon bedding of pipe, fill may be introduced suitable to the type of method that will be used for compaction, i.e., roll compactor, hydraulic vibrator, etc. Lift thickness will be determined in field by inspector and job foreman, with a maximum loose lift thickness of 12" under streets.

3) Compaction test may be taken at random locations and different depths as determined by inspector. Average of two compaction tests will be taken at each 50 lineal foot) (15 M) of trench and test at an elevation to be determined on job site and dependent on depth of trench. Contractor will be required to make excavation for test.

4) Test results for compaction shall meet or exceed following:

   a. 95% standard proctor density for terraces.

   b. 98% standard proctor density for driveways, sidewalks, streets.

   c. Assumption that moisture content (±) 3% of optimum failure of test to reach these minimum results will require recompaction by Contractor.

5) No unsuitable material will be allowed in backfilling, i.e., rock, saturated soils, concrete, brick, motor, vegetation, debris, grasses, etc. Contractor will be required to remove such from job site and replace with adequate amount of approved material. The Contractor shall supply suitable backfill material from an approved borrow site acceptable to the Engineer at the unit price in the proposal.

Any area found unstable because of plastic soils will have to be replaced by the Contractor with suitable material

6) Water settling will not be permitted.

7) If proper compaction requires additional soil to be brought to the site by the Contractor, all expenses for this additional soil shall be considered subsidiary to the pipe installation.

8) Contractor shall return ditch elevations to preexisting elevations as shown on the plans. If it is determined after the construction is complete the Contractor has not done so, he will be required to return the ditch to original elevation at his cost.

9) The Contractor shall hand tamp around all fire hydrants, curbstops, and valve boxes with hand tampers or pad tampers ("Jumper Jacks") to insure proper compaction.

In the event settlement of any backfill associated with the project is encountered, the Engineer shall notify the Contractor in writing to repair all defects, including settlement and associated street repair, if it is discovered within the three (3) year maintenance period. No extra monies will be paid for repairs caused by settlement of the backfill.

4.212 **Trench Wall Support.** All trenches shall be braced or sheeted as to local soil conditions dictate and in full compliance with OSHA, as well as local, State of Nebraska, and other Federal requirements. There shall be sufficient tamped cover over pipe to protect in removal of shoring material.

4.213 **Encasement Pipe.** The encasement pipe for railroad and street crossings shall be installed by tunneling. The encasement pipe shall be installed as shown on the plans. Casing chocks shall be provided as indicated on the drawings. The casing chocks shall be securely fastened to the carrier pipe.

The casing chocks shall be placed approximately 7'-0" (2.1 M) on center with a casing chock placed 3'-0" (0.9 M) from each end of each section of pipe. On a standard 20'- 0" (6.0 M) length of pipe, three casing chocks shall be installed.

Both ends of the encasement pipe shall be closed with a standard pull-on S-shaped seal as manufactured by Pipeline Seal and Insulator Inc., Model S, Advance Model AC End Seal, or approved equal.

After installation of the smooth steel pipe, Hastings Utilities shall install two 48 pound (21.8 Kg) sacrificial anodes or as determined by the Engineer shall be attached and buried at each end of the encasement. The anodes shall be attached to the outside of the encasement, one on each side.

4.214 **Pipe Plug.** The Contractor shall utilize a water tight mechanical plug or cap of appropriate size to secure the open end of the pipe from debris entering into the pipe. This shall be strictly enforced at the end of each day, during any breaks lasting more than 30 minutes or unscheduled stoppage which the pipe may be left unattended for more than 30 minutes. Buckets, duct tape and other methods will not be allowed.

SECTION L-4-3 - METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.301 Water Main. Water main shall be measured for payment by measuring the length down the center line of construction of all pipelines installed, with no deduction for fittings or valves. Payment shall be made at the contract unit price per lineal foot for various sizes, including fittings, excavation and backfill, complete in place. The cost of providing and installing location tape shall be considered subsidiary to the water main.

4.302 Valves and Boxes. Valves and valve boxes shall be paid for at the contract unit price, complete in place.

4.303 Hydrants. Fire hydrants shall be paid for at the contract unit price, complete in place.

4.304 Manholes. Manholes shall be paid for at the contract unit price bid per manhole, for a depth of five feet (5') (1.5 M), which payment shall include footings, ring and cover. Additional payment shall be made for manholes more than five feet (5') (1.5 M) in depth, measure from top of footings to top of cover, at the contract price for each vertical foot or fraction thereof in excess of five feet (5') (1.5 M).

4.305 Fittings. Fittings such as tees, bends, solid sleeves, MJ to MJ adapters, and reducers including all glands and bolts shall be paid for at the contract unit price, complete in place. If in the event additional fittings are required to be installed, then additional fittings shall be paid for at the unit price per pound of the base weight of the fitting.

All ductile iron fitting weights shall be computed using AWWA C153.D.I. Compact Fittings whenever appropriate. In the event a compact fitting weight is not provided by AWWA C153, then the appropriate ductile iron fitting weight as specified in AWWA C110 shall be used. If in the event special items that are called for on the drawings are not referenced in AWWA C110 or C153, then appropriate manufacturer weights shall be utilized. The fitting weights shall consist of the base weight only; all bolts, gaskets and glands shall be considered subsidiary to the pay item.

The Contractor will be reimbursed for actual installed fitting weights using the manufacturers standard weight schedule.

4.306 Boring and Encasement. The construction of encasement pipe shall include boring, excavation, backfill, casing pipe, and cathodic protection. All other items necessary to complete the installation encasement pipe shall be considered subsidiary to the bid item. The amount of encasement installed shall be measured along the center-line of the encasement and shall be paid for at the contract unit price.

4.307 Hydrant Extension. Hydrant extensions as required or as directed by Engineer shall be paid for on a per extension basis; such as 3" (75 mm), 6" (150 mm), 9" (225 mm), etc. Payment shall compensate the Contractor for all labor, fabrication, installation, backfilling, excavating, and all other incidental work as specified or directed by Engineer.

4.308 Valve Box Extension. Valve box extension shall be considered subsidiary to the installation of the valve and valve box.

4.309 Extra Depth Excavation. When deemed necessary by the Engineer for extra depth greater than 2.0 feet (600 mm) from plan grades, addition compensation shall be provided a per foot depth per linear foot basis. Payment shall include all excavating, backfilling, labor, and other incidental work as specified.

No additional compensation will be made when the Contractor varies depth do his operation or failure to control his operation. Additional depth required due to unknown utility conflicts will be provided as specified above

4.310 Tracer Wire. The costs associated with installation of tracer wire shall be considered subsidiary to the bid.

4.311 Tracer Wire Locating Station: The locating station is supplied by HU and installed by the Contractor subsidiary to bid.

4.312 Service Connection. The payment for the installation of a service connection for 3/4" to 2" in diameter shall include all excavations, backfilling, resodding, reseeding, service saddles, connections to tracer wire, corporation valves, purchase of materials, fabrications, and all other incidentals for a complete installation. Payment will be made for each class of work and for each size of service required.

4.313 Water Service Lines. The payment for the installation of water service lines for 3/4" to 2" in diameter shall include all excavation, backfilling, resodding, reseeding, service saddles, installation of tracer wire, water service lines, corporation valves, purchase of materials, fabrications, and all other incidentals for a complete installation. Payment will be made for each class of work and for each size of service required.

4.314 Curb Stop. The payment for the installation of a curb stop shall include all excavation, backfilling, resodding, reseeding, curb stops, connection to tracer wire, purchase of materials, fabrication, and all other incidentals for a complete installation. Payment will be made for each class of work for each size of curbstop required.

SECTION M-TOPSOIL, SEEDING, MULCHING, FERTILIZING & EROSION CONTROL

1. **General.** Ditches, cells, berms and dikes disturbed by construction shall be shaped, seeded, mulched and watered.

   (a) Work Included.

   (1) Preparation of subgrade to receive topsoil

   (2) Spreading topsoil

   (3) Seeding and fertilizing

   (4) Erosion control

   (5) Watering

   (6) Maintaining seeded areas until acceptance

(b) Delivery, Storage and Handling.

(1) Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging and location of packaging. Damaged packages are not acceptable.

(2) Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

(3) All seed shall be a celiified blue seed unless stated as a common seed.

(c) Existing Conditions. Beginning work of this Section means acceptance of existing conditions.

(d) Submittals. Submit shop drawing and product data for erosion control fabrics and seed mixture to Engineer for approval prior to installation.

2. Products.

(a) Growing Media.

(1) Topsoil: Excavated material take from the upper 18 inches of the soil profile, graded free of roots, rocks larger than one inch, subsoil, debris, and large weeds.

(2) Starter Fertilizer: 18-46-0, commercial type with 50 percent of the elements derived from organic sources.

(b) Seed.

(1) Seed Mixture-Type A

Species	*Pure Live Seed/Acre
Big Bluestem	4.0 lbs.
Indian Grass	3.8 lbs.
Switch Grass	1.8 lbs.
Sideoats Gramma	3.41bs
Oats	.Sibs.

*Rates shown are for drilling. Rates shall be doubled for broadcast seeding.

(2) Seed Mixture-Type B

Species	*Pure Live Seed/Acre
Broam Grass	10.0 lbs.
Switch Grass	3.5 lbs
Oats	.5 lbs.

*Rates shown are for drilling. Rates shall be doubled for broadcast seeding.

(3) Seed Mixture – Type C
(Bluegrass (60) – Rye (40)

Bluegrass Species	Pure Live Seed/Sq. Ft.	Pure Live Seed/Acre
Caliper	0.6 lbs.	26.0 lbs.
Newblue	0.6 lbs.	26.0 lbs.
Classic	0.6 lbs.	26.0 lbs.

Rye Species	Pure Live Seed/Sq. Ft.	Pure Live Seed/Acre
Dimension	0.6 lbs.	26.0 lbs.
Palmer III	0.6 lbs.	26.0 lbs.

(c) Accessories. Mulching Material: Prairie hay, oat or wheat straw, reasonably free from weeds, foreign matter detrimental to plant life, and in dry condition. Alfalfa, hay or chopped cornstalks is not acceptable.

(d) Erosion Control Fabric – Type I.

(1) Coconut fiber erosion control fabric shall meet the following requirements:

a) Materials: Coconut at 0.5 lbs/square yard

b) Net – Heavyweight: UL stabilized both sides

c) Roll Width- 6.5 feet minimum

d) Staples shall be 6 inches, 11 gauge

(2) Acceptable Manufactures: North American Green or equal as approved by the Engineer.

(e) Erosion Control Fabric – Type II

(1) Straw fiber erosion control fabric shall meet the following requirements:

a) Materials: Straw at 0.5 lbs/square yard

b) Net- Lightweight degradable, both sides

c) Roll Width: 6.5 feet minimum

e) Staples shall be 6 inches, II gauge

(2) Acceptable Manufacturers: North American Green or equal as approved by the Engineer.

3. **Execution.**

(a) Preparation.

(1) Protect existing underground improvements from damage.

(2) Remove foreign materials, plants, roots, stones and debris from site. Do not bury foreign material.

(3) Remove contaminated subsoil.

(4) Cultivate area to receipt topsoil to depth of 3 inches. Repeat cultivation to areas where equipment has compacted subgrade.

(b) Spreading Topsoil.

(I) Spread topsoil to depth of 6 inches over area to be seeded. Place during dry weather and on dry, unfrozen subgrade.

(2) Cultivate topsoil to depth of 6 inches with mechanical tiller. Cultivate inaccessible areas by hand. Rake until surface is smooth.

(3) Remove foreign materials collected during cultivation from site.

(4) Grade to eliminate rough spots and low areas where ponding may occur. Maintain smooth, uniform grade.

(5) Assure positive drainage away from buildings.

(6) Finish ground level firm and sufficient to prevent sinkage pockets when irrigation is applied.

(c) Fertilizing.

(1) Apply fertilizer at a rate of 200 lbs. per acre.

(2) Do not apply grass seed and fertilizer at same time or in same machine.

(3) Lightly water to aid breakdown of fertilizer and to provide moist soil for seed.

(d) Seeding.

(1) Apply seed at rates indicated earlier in this section.

(2) The Contractor shall notify the Engineer at least 48 hours in advance of the time he intends to begin work and shall not proceed with such work until permission to do so has been granted by the Engineer.

(3) Seeding operations shall be performed only during the periods between March 1 and June 1 and between August 1 and September 15 except by express permission of the Engineer. No work shall be performed during excessively windy weather or when the ground is frozen, wet or otherwise untillable.

(4) For seeding, approved mechanical power drawn drills, broadcast type seeder or hydraulic seeders may be used.

(e) Mulching.

(1) Mulch shall be either dry cured native hay or threshed grain straw. Hay or straw shall be free from seeds of noxious weeds and relatively free from seeds of all other weeds.

(2) The Contractor shall apply a protective mulch within 48 hours after sowing the seed, unless otherwise directed by the Engineer. The mulch shall be applied with a mulch blowing machine or other approved methods at the rate of two tons per acre.

(3) Immediately following the spreading of the mulch, the material shall be anchored to the soil by a V-type wheel land packer, a soil erosion mulch tiller, or other suitable equipment which will secure the mulch firmly to foml a soil-bind mulch.

(4) Straw mulch is required on all areas to be seeded that do not receive erosion control fabric.

(f) Erosion Control Fabric.

(1) A straw fiber drainage blanket (Type II) shall be used along the bottom of the drainage ditches as indicated at locations on the plan.

(2) A coconut fiber drainage blanket (Type I) shall be used in the storm water collection sump(s) as indicated at locations on the plan.

(3) The total width of the area to receive Type II drainage blankets shall be no less than 11 feet.

(4) All blankets shall be stapled using no less than two staples per square yard.

(5) All blankets shall be installed keyed into shallow trenches along the perimeter. Follow manufacturer's recommendations.

(g) Watering. Watering shall not begin until completion of the mulching operation. All areas shall be wetted as required to start the moist soil conditions necessary to assure seed germination and growth. At least one additional watering will be required after the initial period as directed by the Engineer.

(h) Measurement and Payment.

Seeding will be measured and paid for at the contract unit price per acre for "seeding", which payment shall be full compensation for top soiling, shaping, seedbed preparation, seed, planting, mulching, watering and all incidentals required to complete the item of work.

Erosion control fabric will be paid for at the contract unit price per square yard for the specified type, which payment shall be full compensation for all material, grading, labor and incidentals required to complete the item of work.

(i) Acceptance. Seeded areas will be accepted when seeded areas are properly established and otherwise acceptable. This shall include any reseeding that may be required beyond the standard one year warranty, but in no case longer than three years from the date of initial Final Completion.

SECTION N - POLYUREA PAVEMENT MARKING, GROOVED (D-11-0308)

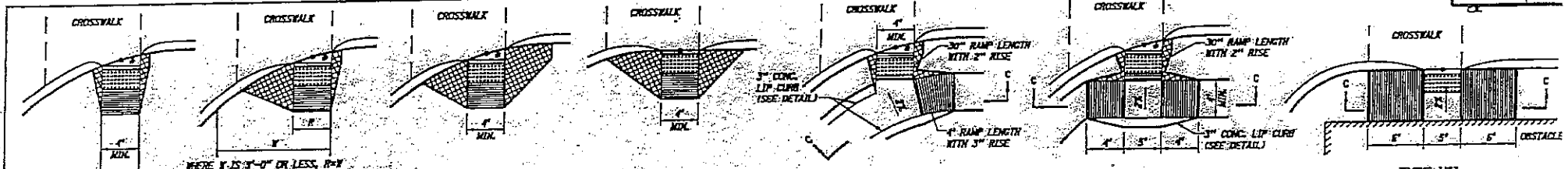
Section deleted-not applicable to this contract.

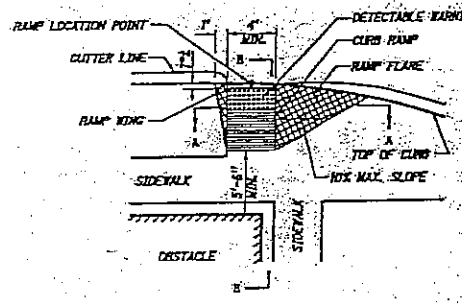
SECTION O — METHOD OF PAYMENT

The Engineer will compile a detailed estimate of cost of work completed at the end of each week. Said estimates, being approved by the Engineer, will be submitted to the Hastings City Council each month for payment. A 10 percent retainage on each estimate or total accumulative estimate will be held by the City until at which time the job has had final approval and acceptance by the Engineer.

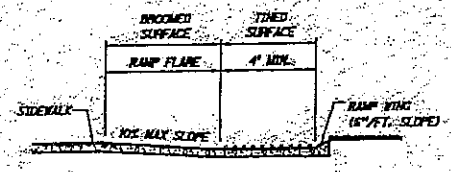
SECTION P — GUARANTEE OF WORKMANSHIP AND MATERIALS

The Contractor shall guarantee all materials, workmanship and successful operation of all work furnished and installed by him for a period of one year from the date of final acceptance of the whole work and shall guarantee to repair or replace at his expense any part of the work which shows defect during the guarantee period, provided such defect is, in the opinion of the Engineer, due to imperfect material or workmanship.



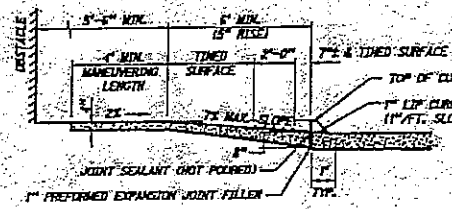


TYPICAL CURB RAMP DETAIL



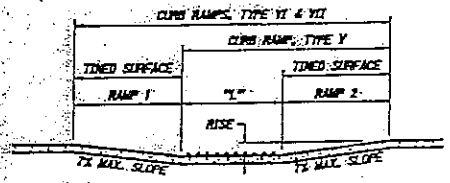
SECTION A-A

TYPICAL RAMP CROSS SECTION



SECTION B-B

TYPICAL RAMP PROFILE



CURB RAMP	RISE	"L"	RAMP 1	RAMP 2
TYPE V	3"	VAR.	N/A	4'
TYPE VI	3"	5'	4'	4'
TYPE VII	5"	5'	6'	6'

SECTION C-C

TYPICAL RAMP CROSS SECTION

NOTES:

THE NORMAL GUTTER LINE PROFILE SHALL BE MAINTAINED THROUGH THE AREA OF THE CURB RAMP.

THE SURFACE OF ALL CURB RAMPS SHALL BE TINED TRANSVERSELY TO THE SLOPE OF THE CURB RAMP. THE TINES SHALL PRODUCE GROOVES APPROXIMATELY ½" WIDE AND ¼" DEEP ON ½" CENTERS. ALL FLARES AND WINGS SHALL BE BROOMED.

CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE CURB RAMP, FREE OF SAGS AND SHORT GRADE CHANGES.

THE RAMP FLARES SHALL BE CONSTRUCTED WITH A 10% SLOPE AT RIGHT ANGLES TO THE SLOPE OF THE CURB RAMP, TYPES II, III & IV.

THE SLOPE OF SIDEWALKS APPROACHING CURB RAMPS (OR THEIR FLARES) SHALL BE FLAT ENOUGH TO PROVIDE RECOVERY AREAS FOR WHEELCHAIRS ENTERING OR EXITING THE RAMPS.

THE WORK OF CONSTRUCTING THESE RAMPS SHALL BE MEASURED AND PAID FOR AS A PART OF THE WORK FOR "CONCRETE SIDEWALKS", "CONCRETE MEDIAN SURFACING" OR "CONCRETE BIKEWAY". THE WORK OF MODIFICATION OF NEW OR EXISTING CURB WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS OF WORK FOR WHICH DIRECT PAYMENT IS MADE.

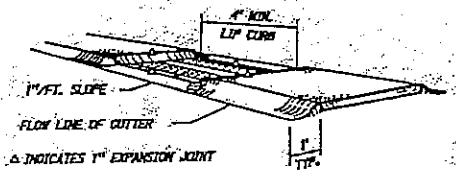
MAXIMUM PERCENT OF SLOPES ARE RELATIVE TO THE SLOPE OF THE ADJACENT SIDEWALK.

DETECTABLE WARNINGS SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP. THEY SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS 6" TO 8" FROM THE CURB LINE.

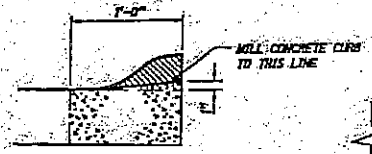
# INDICATES 0.02"/FT. SLOPE TOWARDS STREET.

LEGEND

- DETECTABLE WARNINGS
- TINED CURB RAMPS
- BROOMED RAMP WINGS & FLARES
- MILLED CONCRETE

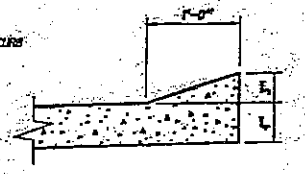


MEDIAN CROSSING

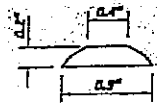


NOTE:
COMBINATION CONCRETE CURB AND GUTTER MAY BE REMOVED AND REPLACED IN LIEU OF MILLING.

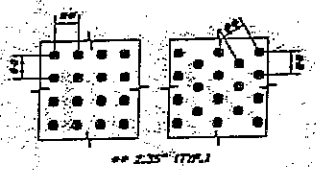
CURB REMOVAL DETAIL



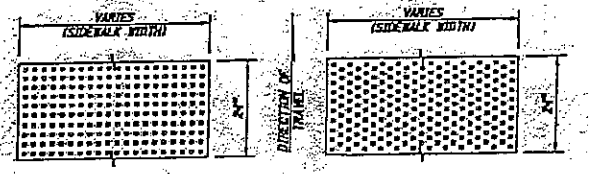
3" CONCRETE LIP CURB DETAIL



DOME SECTION



DOME SPACING



DOME ALINGMENT

DETECTABLE WARNING DETAILS

CURB RAMPS

SPECIAL PLAN C

91